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/7/ FORWARD

Having been occupied for years with drawing up a comprehensive scientific study of the land of the Soviet Union, I have decided to cut off a piece of this country and to postpone the description of the whole country. For this I have selected the Far East for specific, authoritative reasons. It is of course known that Russia and also the Soviet Union transfer the emphasis in their political activity according to the circumstances at the time. At one time it lies in Europe, i.e. in the extreme west as viewed from the total expanse of Russia, and then again it lies in the opposite section of this immense empire, which the Russians and we too designate as the Far East. The latter is at present the case: the Soviet Russian Far Eastern regions constitute a base and a point of departure. The description of these regions in their basic geographic traits and in their economic bases and problems is the main task assigned to this work. 121

The present work rests both on my own knowledge obtained on my trips and on detailed study of all available literature. My personal knowledge is limited, to be sure, to only a part of the Soviet Russian Far East; but nevertheless I have not hesitated to treat all regions. Decisive for me in this connection was the thought that even the best known Russian geographers, to whom we are indebted for a description of the entire Russian area, were acquainted with only part of the land from their own experience, and for the rest they had to rely on other researchers, their descriptions and findings. I may assert the same for the present work. In this connection it must be stated that Soviet scientific research has done work worthy of recognition. It is only regrettable that the numerous and valuable results of this research are not made accessible to foreign science. This applies to important branches of research in geography and especially to economics. 114

In the subtitle this work is designated as a survey of the land and the economy, and it also shall not be more nor less than that. The space at my disposal doesn't permit going into great detail on the historical development or on the individual regions in the special section, as perhaps might be /8/ desired. It would have been possible; but it would have required volumes. Accordingly the treatment was consciously limited to broad lines in order to give, in addition to an overall view, a clear picture of the individual parts. In the 121

121 process much had to be dispensed with, and much investigation going into detail had to be left by the wayside in the interests of the whole. For the same reason the simplest possible presentation has been chosen for treating the subjects, without thereby reducing the scientific character of the work. In everything I have been led by the conviction that the present work would fill a gap existing not only in German literature but also in the general literature.

Since the natural resources of the land are of striking importance as a basis for the economy and its perspectives, treatment of the resources was given additional space, and, in conjunction with the past and clearly recognizable uses of the resources, an attempt was made to point out tendencies in the economic development. Only all the available sources and reports could be used for this because of the lack of official data, and, after careful consideration and critical evaluation, they were employed for judging economic progress and its problems. On this subject it is better to say too little than too much.

000 I owe thanks to many friends for much advice and many suggestions in drawing up the work and also for providing me with material. Very special thanks I owe to Prof. Dr. h.c. H. Lautensach, Stuttgart, Prof. Dr. G. Ipsen, Dortmund, Forest Master Dr. E. Buchholz, Reinbeck bei Hamburg, and Dr. H. Klocke, Wiesbaden. Last but not least I wish to thank Prof. Dr. Arved Schultz, Düsseldorf, my especially deserving teacher in the field of geographical research in the east; I will always remain bound to Prof. Schultz, who this year celebrated his seventieth birthday.

The Osteuropa-Institut, Munich, and its director, Prof. Dr. H. Koch I thank for accepting the work in the series of publications put out by the institute.

Munich, May 1953

Erich Thiel

/9/ A. GENERAL SECTION

/10/ /blank/

/11/ THE NATURAL CONDITIONS

Significance, Location, and Size

Soviet Far East: Bracketed under this name are all the Soviet Russian eastern regions, whose waters empty into the Pacific Ocean, which lie predominantly under the climatic influence of the Pacific, and which morphologically have a certain demarcation from the other parts of the Soviet Union through high mountain ridges. It is the entire Pacific coastal area from Vladivostok in the south to the Artic expanses of the Chukchi Peninsula in the north. Soviet Russian science also comprises in its term "Dal'niy Vostok, " /Far East/ the same region circumscribed here, and accordingly follows the major division of Asia drawn up by Carl Ritter and Ferdinand Freiherr von Richthofen. According to this division, the entire peripheral eastern slope of the continent is designated as "East Asia. " The hinterland of the coastal border belongs to the Far Eastern region insofar as its waters empty into the Pacific Ocean, and the natural demarcation is clear. However, in this work Lake Baykal is set as the western border, and a few words are necessary justify this. Transbaykal, which lies between Lake Baykal on the west and the Argun, the right source river of the Amur, does not comply fully with the above prerequisites. It has a transition position; for, it belongs only partly to the river area of the Amur and partly to that of the Yenisey and the Lena. It also doesn't fit into the Russian concept of "Dal'niy Vostok, " here it should not be brought into the concept of the real Far Eastern regions either. However, the transportation and economic connections of Transbaykal are linked much more with the east than with the west; it is linked specifically with the Far East in the broadest sense. One could try to designate Transbaykal directly as the platform of the position of the Soviet Union in East Asia. Here begins the Amur, which has pointed the way to the east for the Russians and which the Russians have followed with a land route and a railroad. Transbaykal is further the starting point both for traffic lines laid by the Russians through Manchuria to the Pacific and also for old historical routes 131

131 through Mongolia to China, routes which are no less important at present. For these reasons the inclusion of Transbaykal in the comprehensive overall concept of the "Soviet Far East" seems not only justified but even necessary for better understanding of how things fit together.

/12/ Through the Far Eastern regions the Soviet Union has a continental coast on the Pacific, which is more than 10,000 kilometers long, and through this she has become an important neighbor /Anlieger/. The outcome of World War II has brought the Soviet Union into possession of southern Sakhalin and the Kurils. With this the Japanese protective chain of the Kuril was eliminated, and the Sea of Okhotsk, with an area of 1,530,000 square kilometers, became for all practical purposes an internal sea of the Soviet Union; and it is now even officially regarded as belonging to the national sphere of the USSR. This pressure of Soviet power toward the Pacific Ocean has resulted in broader prospects of naval development for the Soviet Union than in the past, since the naval development had had to be limited to the continental coast. In this connection, Sakhalin Island, pointing [312] toward the Japanese island empire and separated from Hokkaido only by La Perouse Way, scarcely 50 kilometers wide, deserves special attention since, through a dam completed in 1952, it has been linked to the continent and for all practical purposes has become a part of the continent. With the southwest side of Sakhalin and the Maritime Krai, the Soviet Union now lies also on the Sea of Japan. Through her large section on the coast and through her possession of the islands extending in front of the coast, the Soviet Union has the prerequisites, not everywhere favorable but still sufficient, for developing into a Pacific sea power. Even though the Russians, being a continental people, have in the past always given preference to land routes, there are still numerous indications that the sea also is not foreign to them. If the Soviet Union still today does not take the corresponding position, that does not mean that it must always remain so. Pretensions to such a position have very probably been proclaimed in the intensive building up of the various harbors for military and trade purposes.

The greatest importance of the Far Eastern region for the Soviet Union lies in the fact that it guarantees access to the open sea to this strong continental power. Although the usefulness of the individual ports on the ocean within the Soviet Union's national territory is impaired and their importance reduced by unfavorable natural conditions, these ports exist, and their shortcomings have become a principal motive for building them up individually, for broadening the general access to the sea, and for forming better and easier access through new routes, whether or not these routes lie through the Soviet Union's own territory. Probably in no country in the world has the natural striving toward the sea come out so clearly in history as in Russia, where the strivings have been toward the east to the shores of the Pacific Ocean. This was first reached in 1649 on the Sea of Okhotsk. Okhotsk formed the first point of departure for undertakings along the coast and on the sea. However, the long, difficult route from the hinterland and the harsh climate caused the Russians to go further to the south in their search. New hopes were awakened in them by the discovery of the great Amur River at whose mouth they /13/ expected to find a favorable exit to the sea. But soon they learned that here, too, the goal had not been attained. Their view shifted searchingly further along the coast to the south, to regions more favorable climatically. They discovered a suitable natural bay, which, in their exaggerated hopes, they designated as the eastern "Golden Horn." Vladivostok came into existence. But here, too, ice blocks the entrance for three months, and the entrance can be kept free only laboriously with the help of strong ice breakers. In the groping search for a favorable harbor the Russians later came to the Liaotung Peninsula where in Dalny' /Dairen/, the "Distant," another good natural harbor was found and made secure by the neighboring naval harbor, Port Arthur. The Russians were little disturbed that the two last-named harbors lay in foreign territory. An agreement with China was soon reached, and after a short time railroad tracks led from Transbaykal right through the middle of Manchuria to Vladivostok and to Dalny', which the Japanese later renamed Dairen. But even here development in the striving for a connection with the outer world does not appear to have been concluded. Already a railroad line stretches from Ulan-Ude in Outer Mongolia to Ulan Bator. Only a stretch of around 800 kilometers, which even now can be traveled by trucks the entire year, is still to be built, and with this the railroad track in Kalgan will be connected with the railroad line which leads via Peking to the harbor of Tientsin. In this fashion a new, additional exit to the sea would be attained. The prerequisite for this development, of course, is that the neighboring states, in this case Outer Mongolia and China, don't put up any resistance to these strivings and find themselves in political-economic harmony with the great continental power in the north.

131 The pivot of this circle in its movement from north to south, from the mouth of the Amur to Tientsin, lies in Transbaykal, from which radiate the main traffic lines in these directions. The radius of this circle has currently been shortened by the airline from 2,250 kilometers to around 1,600 kilometers.

If Transbaykal thus represents the point of departure for the power position of the Soviet Union, this region's large share in the total area of the Far East constitutes a foundation; for through this region the Soviet Union has also become an East Asian land power, which is undoubtedly very conscious of its position as such. The fact that Manchuria is surrounded /by Russia/ on the northwest, north, and east and the fact that the railroad lines to Vladivostok and Dalny' /Dairen/ run through Manchuria brought this Chinese region under the economic influence of the Russians even in Czarist times. When as a result of the outcome of World War II the Russians won back the positions in Manchuria which they lost from 1903 to 1940, the Russians were again in possession of or had the use of the main railroad lines in Manchuria and the harbors in /14/ southern Manchuria. This means for the Soviet Union again an extension of her economic sphere of influence, which at least equals that of the Czarist empire at the time of its greatest power, and even far exceeds this if consideration is taken of the political events and proceedings of the last few years in East Asia.

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311 In this the strength of the Soviet Russian position in East Asia depends essentially on the development of her own Far Eastern regions. The present state of colonization and the economy both in Transbaykal and in the real Far Eastern regions shows that these are only at the beginning of their development. Up to now only a small percentage of the land suitable for agriculture has been brought under cultivation, and the exploitation of the natural resources has begun only in small areas. However, the progress which has been made in these spheres even during the Soviet regime reveals that this regime is determined to continue to give the necessary stress and upsurge to the favorable beginnings. The preferred, planned colonization shows this; and the tendency apparent in recent years to lead stronger forces into the industrial sector also indicates that the Soviet Union has the intention of creating in these regions a balanced economy in which all natural resources are given equal recognition. The planned economy of the Soviet Union, which intends to give as self-sufficient as possible a position to all the large economic areas, is especially

clearly manifest here; indeed, the distance and the remoteness of 185
this region from the economic centers of the total union even force 311
them to pursue this policy. In this, a role is not only played by the basic thought of populating these remote but well-situated regions, but also of making them as self-sufficient and strong economically as possible. The opportunities which are given the Soviet Union here cannot be estimated. They are great; only time is required to exploit them.

In connection with the above statement the unique position 496
which the Far Eastern transportation network occupies within the Soviet Union as a whole, deserves to be brought out. A look at the map shows that the entire, complicated railroad network in the western part of the Soviet Union comes together into a single railroad line as it heads toward the Far East. This crosses the Yenisey at Krasnoyarsk and runs as far as Ulan-Ude in Transbaykal. Only here does it begin to split up and to develop into a transportation network, insofar as one can speak of such a thing in the Far East. On this single railroad line, which does, however, have two tracks, depends the entire connection of Transbaykal and the Far Eastern region with the rest of the Soviet Union. Even the completion of the Baykal-Amur line does not eliminate the bottleneck at Krasnoyarsk, and accordingly /15/, a certain self-sufficiency is the result of the development of the railroad network in the Far East.

Transbaykal and the Far Eastern region represent the extreme 131
border position of the Soviet Union in East Asia. As remote border regions, they are really the Far East for the European part of Russia. One sees the sun rise and set eight times before one, coming from Leningrad in the Siberian Express, reaches Chita, the capital of Transbaykal, and another day and a half passes before one arrives in Vladivostok. More than 8,000 kilometers by air lie between the western and eastern borders of the Soviet Union. Chita is 6,236 kilometers by railroad from Moscow; Vladivostok is 9,333 kilometers from Moscow via Khabarovsk, and still 8,312 kilometers via the north Manchurian line by direct route.

But even within the Soviet Far East, a distance which seems extraordinary to the European has to be covered to travel from one end to the other. There are around 2,500 kilometers between the southwestern tip of Lake Baykal and the mouth of the Amur, and the airline from Pos'yet Bay, southwest of Vladivostok, to Cape Dezhnev on the Bering Strait is almost 5,000 kilometers long. Sakhalin Island

131 from north to south is almost 1,000 kilometers long, and Kamchatka Peninsula stretches around 1,600 kilometers into the sea from the mainland. These few facts may be enough to give some notion of the vast distances and also the size of the land. / The land covers 3,850,000 square kilometers. That is more than fifteen times the size of Great Britain and Northern Ireland or seventeen times the area of France. But this vast area ≠ is in European terms practically empty of
161 people; for in one square kilometer taken as the general mean, there
311 are only 1.6 persons--even if estimated population of 6.3 million in 1950 is taken as a basis. That is extraordinarily sparsely settled. However, in order not to give any false notions, it must at the same time be noted that the actual distribution of people is entirely different. In the southern parts there are regions which are much more thickly settled, while in the vast areas away from the transportation lines, especially throughout the north, in areas of many square kilometers only one person is to be found.

The southern regions--Transbaykal, Amur Oblast, Maritime Krai, the greater part of Kamchatka, and also Sakhalin--are completely suitable for accepting people, even though the harsh climate brings certain hardships. But the Russians are more accustomed to bearing such conditions and better suited for overcoming them than any other European people. Thus Transbaykal and the real Far Eastern regions of the Soviet Union offer settlement opportunities with good prospects for the excess population in other /16/ sections. The population has continuously and considerably increased through immigration:

1911	1,723,754
1926	2,304,000
1939	4,039,000
1950	6,300,000

631
161 The administrative division corresponds approximately with the natural provinces named in the concept "Soviet Far East" although the borders do not coincide exactly. However, in order to be able to use figures and statistics, it is necessary for practical reasons to make the administrative regions equivalent to the provinces. Unfortunately exact data for this purpose are available only for the time of the last census on January 17, 1929. These data give the following figures for the Soviet Far East: /Table on Following page/

≠ [i.e. The Soviet Far East—Analyst]

631
161

	Administrative Unit	Size	Population
1.	Buryat Mongol Autonomous Socialist Soviet Republic	331,400	542,200
2.	Chita Oblast	720,000	1,159,500
	Transbaykal	1,051,400	1,701,700
3.	Khabarovsk Krai	2,572,000	1,430,900
4.	Maritime Krai	206,600	907,200
	Far Eastern Region	2,778,600	2,338,100
	Total for the "Soviet Far East"	3,830,000	4,039,800

Under the above basic division, the following comparisons can be made. Transbaykal comprises approximately one-twentieth of the total area of the Soviet Union (1939: 21,175,208 square kilometers), but it has only a hundredth of the population. In the Far Eastern region the contrasts are still greater; for in area it has an eighth of the total, but it has only an eightieth of the population in the entire country. Therefore, even in comparison with the Soviet Union there is an extraordinary disproportion between area and population, which indicates that here are special relationships with both geographical and historical bases. These will be discussed in detail later. 161

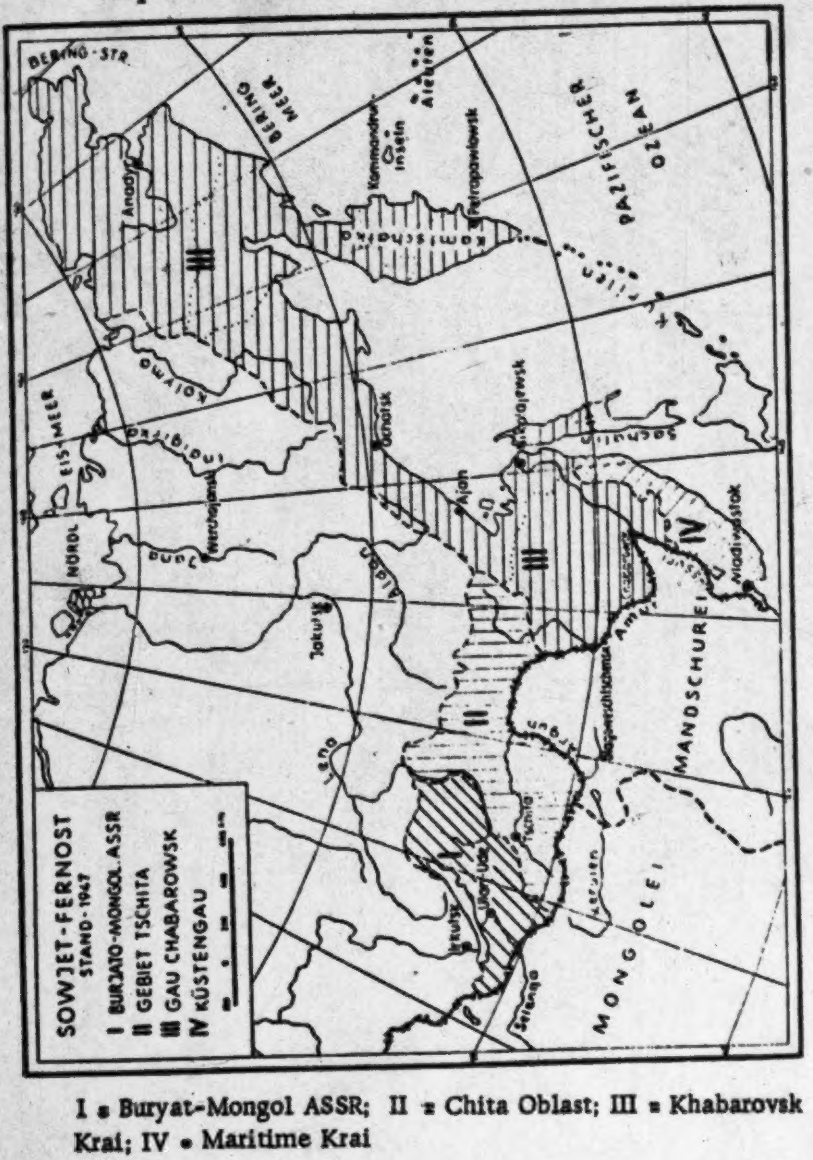
The recent past has brought a change in the administrative division. Two new administrative regions (oblast) were formed, namely Amur Oblast (1948) and Sakhalin Oblast (1947). To the first was attached a part of the old Chita Oblast and a part of Khabarovsk District (Krai). Its size is 360,100 square kilometers. Blagoveshchensk was selected as the capital of the oblast. To Sakhalin /17/ /Map of the Soviet Far East as of 1947:/ /18/ Oblast belongs the entire island (64,750 square kilometers) and the Kurils (15,600 square kilometers); the capital is Yuzhno-Sakhalinsk. 631

The border separating these from the other parts of the Soviet Union has, however, remained the same. Accordingly, the following administrative units belong to the Soviet Far East at present:

1. Buryat-Mongol ASSR
2. Chita Oblast

Map of the Soviet Far East as of 1947:

631


SOWJET-FERNOST
STAND-1947
I BURJATO-MONGOL. ASSR
II GEBIET TSCHITA
III GAU CHABAROWSK
IV KÜSTENGAU
BERING-STR.
NÖRDL. EIS-MEER
BERING MEER
Anadyr
Kolyma
Indigirka
Jana
Werchojansk
Jakutsk
Lena
Aldan
Ochotsk
Ajan
Nikolajewsk
Kamtschatka
Petropawlowsk
Kommandeur-Inseln
Aleuten
Kurilen
Sachalin
PAZIFISCHER OZEAN
Irkutsk
Ulan-Ude
Tschita
Selenga
Kerulen
Argun
Blagoweschtschensk
Amur
Chabarowsk
Ussuri
Wladiwostok
MONGOLEI
MANDSCHUREI
I
II
III
IV

I = Buryat-Mongol ASSR; II = Chita Oblast; III = Khabarovsk Krai; IV = Maritime Krai

2 Sowjet-Fernost

631 3. Khabarovsk Krai
5. Maritime Krai
6. Sakhalin Oblast

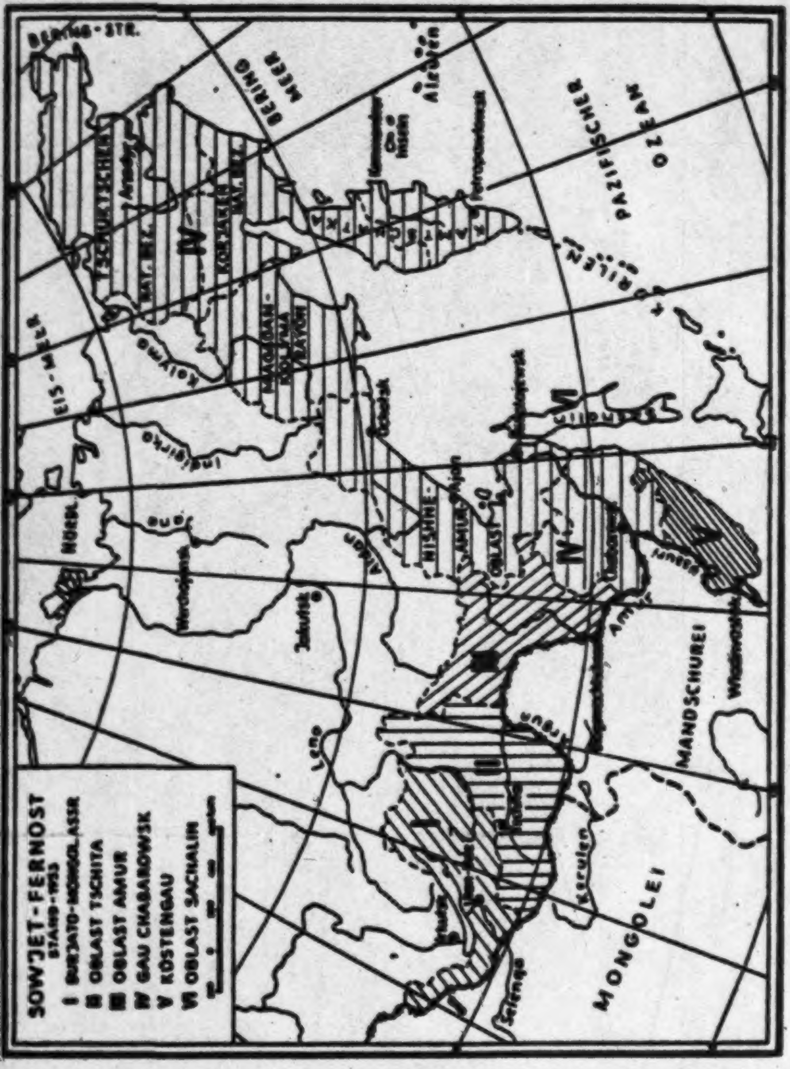
The two sketch maps inserted in the book show the old and the new administrative division. In the following presentation the old administrative units must be used as a rule in statistical information.

The new division of the administrative regions which has been made often during the period of Soviet rule, shows that the Soviet Far East is still not in its final from, neither as to population nor as to the development of its economy nor yet as to its administrative order; everything is in vital flux, everything is coming into being and becoming.

Unveiling and Occupation

175 484 The conquest of Siberia, begun in 1581 by Yermak and his Cossacks, moved forward to the east very quickly, unhampered by the sparse population. It followed the great rivers, whose watery courses served the Cossacks both as a route and as a sign-post into the vast areas never before tresspassed upon by a European. River area after river area was thus transversed by them and secured by bases remaining there. Already by 1632 the city of Yakutsk was founded in the land of the Yakut on the middle Lena, and from then on this city served as a starting point for further pressure forward. In 1638 a Cossack division of Ataman Koplov proceeded along the Aldan and its tributary the Maya. They wanted to go to the "Great Sea," which the Tungus reported to them and which the Tungus called the "lamu," the "sea." However, they went only around 100 kilometers along the Maya and then had to stop for the winter. A smaller group under the leadership of the Cossack Moskvitin advanced farther along the way. They carried their boats from the upper Maya over the watershed of the Dzhugdzhur and reached the Ul'ya, which carried them on. In 1649 these Cossacks reached the coast of the Sea of Okhotsk, being the first Europeans to do so. At the mouth of the Ul'ya, somewhat south of present day Okhotsk, Mosvitin established a base and explored the coast to the north and south and /19/ /Map of the Soviet Far East as of 1953:/ /20/ went as far as the mouth of the Uda. However, he did not find the Shantar Islands. They were discovered only in 1710. Another Cossack by the name of Shelkovnikov founded

Map of the Soviet Far East as of 1953:


SOWJET-FERNOST
STAND-1953
I BURJATO-MONGOL.ASSR
II OBLAST TSCHITA
III OBLAST AMUR
IV GAU CHABAROWSK
V KÜSTENGAU
VI OBLAST SACHALIN
EIS-MEER
BERING-STR.
TSCHUKTSCHEN NAT. BEZ.
Anadyr
IV
KORJAKEN NAT. BEZ.
MAGADAN-KOLYMA RAYON
BERING MEER
Kommandeur Inseln
Aleuten
Petropawlowsk
KAMTSCHATKA
NÖRDL.
Werchojansk
Jana
Indigirka
Kolyma
Jakutsk
Lena
Aldan
Ochotsk
NISHNE-AMUR OBLAST
Nikolajewsk
VI
IV
Chabarowsk
Amur
III
Argun
II
I
Irkutsk
Ulan-Ude
Tschita
Selenga
Kerulen
MONGOLEI
MANDSCHUREI
Wladiwostok
V
KURILEN
PAZIFISCHER OZEAN

I - Buryat-Mongol ASSR; II - Chita Oblast; III - Amur Oblast;
IV - Khabarovsk Krai; V - Maritime Krai; VI - Sakhalin Oblast

the sea base Okhotsk at the mouth of the small river Okhota still in the same year of 1649; Okhotsk has for a long time served as the Russians' main harbor.

From Yakutsk northeastern Siberia was also opened up. In 1633 Rebrov and Perfiliev went down the Lena into the unknown distance and reached the Artic Ocean, which they followed along the coast to the east and discovered the mouth of the Yana. Ivan Yerastov, proceeding from the Yana, reached the Indigirka and the Alazeya in 1641. In the same year Stadukhin went farther to the east and came to the Kolyma, where he founded the base Nizhne-Kolymsk in 1644. He didn't go farther east, since ice blocked his way, so he turned back to Yakutsk in 1645. Stadukhin brought the first reliable reports on the Chukchee. In 1646 Ignatiev reached the Chaun Bay. In Stadukhin's division which pressed forward to the mouth of the Kolyma was Semion Dezhnev, whose name has endured in the history of the discovery of northeastern Siberia. Despite previous failures, this bold Cossack sea traveler again proceeded east from the mouth of the Kolyma with seven small boats. His goal was the mouth of a large river (the Anadyr'), which by hearsay was supposed to empty into the sea further to the east. In 1648 he sailed around the cape named after him and thus determined the northeastern end of the Asiatic continent. Thus Dezhnev was the first European to travel in the Bering Strait. Because of the thick fog he could not see the American coast on the other side of the strait, but he did report on two islands (Diomede Islands). Dezhnev must have gone very far to the south, for when he was stranded with his boats as a consequence of a storm, he had, according to his own report, to double back to the north, going by foot for ten weeks, in order to reach the mouth of the Anadyr'. The conjecture that Dezhnev eventually reached Kamchatka, cannot be discarded. It can be taken as certain the Popov, one of his companions, traveled around Kamchatka and in Penzhina Bay met other Russian sea travelers coming from Okhotsk. Thus the circle of the Russian opening-up of northeastern Siberia was closed along the coast, where the Dezhnev route and the Moskvitin direction met. Popov later traveled the Tigil' River on Kamchatka, where he died. His fellow travelers were killed in a disagreement with the natives. There are various documents from Dezhnev and his companions, and these documents report not only on the regions discovered but also on the inhabitants, the Chukchee, the Koryak, and the Eskimo.

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In 1647 Stadukin started out from Yakutsk again toward the Kolyma area, where he remained until 1649, and then he took up again /21/ his old plan of finding the Anadyr'. He knew nothing of the success of Dezhnev's trip. Restrained by his first failure in 1643-44, he selected the land route and thus followed the direction which a scarcely known Cossack by the name of Motora had already taken before him. Stadukhin followed the Anyuy, probably the Lesser Anyuy, and with great difficulty crossed the watershed of the present Anadyr' Mountain, and also reached the river of the same name, which he followed to its mouth, where he met Dezhnev. But later he returned to the interior of the Anadyr' region and there founded a base, whose location is unknown. Stadukhin later appeared in Penzhina Bay. It cannot be determined whether he got there by the land or the sea route. His last known deed was the founding of a settlement on Tauyskaya Bay. To Stadukhin we owe the first reports on the interior of northeastern Siberia.

Although Kamchatka had already been touched by various Russians, Cossack leader Atlasov was the first to succeed in taking possession of the peninsula for Russia. In 1697 he was sent out as the commander to the Anadyr', and still in the same year he pressed in to the interior of Kamchatka and established a base in the center of the peninsula on the Kamchatka River. Atlasov was named the first Russian administrator of Kamchatka. Fights with the natives and also with his own Cossacks didn't make his work easy. In 1707 the Cossacks got angry and imprisoned Atlasov, whom they accused of misuse of his office and cruelty. In 1711 he is supposed to have been killed. From 1711 to 1718 there followed the discovery of the Kurils, in which Kosyrevskii in particular performed great service.

It is remarkable that Japan is never mentioned in the reports of the expedition leaders. Atlasov was the first to whom such a report goes back. Once he spoke of a Japanese who was driven onto the land by a shipwreck on the western coast of Kamchatka and who lived with the natives. In 1701 he was brought to Moscow by the Russians, and there he caused great commotion by his tales, and even Peter the Great occupied himself very much with getting a school built for him in which he was to teach Japanese language to a select group of Russian subjects. This school existed until 1739. Its pupils took part in the Bering expedition as interpreters. In another report Atlasov makes a remark that Japanese are supposed to have lived on the southern tip of Kamchatka. For the rest his reports are filled with descriptions of the land. Kamchatka's wealth in fish and valuable fur-bearing animals is given especial attention; among the latter the sable and the Kamchatka beaver, as the great sea otter was falsely named, are prominent. For this reason the Russians at that time also called the Bering Sea the Beaver Sea. Kosyrevskii, the /22/ discoverer of the Kurils, later met Japanese several times. His reports on Japan increased Peter the Great's interest in the Far East; he gave the order to conduct further exploratory trips and to secure the unoccupied land for Russia. Already by 1718 all the Kuril Islands were included in maps.

Among Dezhnev's successors the rumor appeared that farther to the east land was supposed to lie on the other side of the ocean. These rumors relied on the reports of the natives of the Chukchi Peninsula, who asserted that in winter that continent, which they designated as the "Great Land," could be reached over the ice. Atlasov called special attention to these reports, and he had the still unknown land drawn on his maps; but it was only Bering and Chirikov who reached Alaska for the first time in 1741 and took possession of it for Russia. A further advance of the Russians followed with the Aleutian Islands and the southern coast of Alaska serving as the guiding lines. In 1812 there were Russian settlers 40 miles outside of San Francisco and a base close to San Francisco. This was the most distant point which the Russians reached in their rapid and dashing settlement of the east. A backward movement followed. In 1867 Alaska, which at that time was considered valueless, was sold to the the United States for 7.2 million dollars, and with this Russia limited herself to the western side of the Pacific.

The movement of the Russians into the still unknown regions of the Far East occurred partly as a result of official orders; in this case the administrative offices in the hinterland carried out the formation and equipping of mostly very small expeditions and also chose the leaders; but in part this movement was the result of private undertakings. The voivode followed then in the tracks of both. The main goal of all expeditions was to take possession of the land through the establishment of bases and to insure the collection of the "yassak," a kind of head tax, which had to be paid by the natives in valuable furs. Also participating in the official expeditions were the private entrepreneurs, the "promyshlenniki," mostly fur traders and hunters, who distinguished themselves in the gouging of the natives no less than the official administrators. Thus it came about that the natives,

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who were shamelessly exploited, often turned against those moving in. Great battles took place with the Chukchee, Koryak, and Kamchadal, and these were decided in the Russians' favor because of their superior weapons. But again and again there were attacks on and murders of collectors of the "yassak." Only at the end of the eighteenth century did peace and order return to the land.

The occupation of Transbaykal and the Amur region did not keep pace with the advance of the Russians in the north; for in Transbaykal and the Amur region the Russians encountered a population which was by comparison more thickly settled and which already had a state /23/ organization. When the Cossacks in 1648 advanced from Irkutsk into Transbaykal, they were first attacked by the nomadic people, the Buryat, a Mongol tribe. Only step by step did they succeed in advancing to the Argun and getting a foothold there. Reconnaissance into and occupation of the Amur area was done, therefore, from the north, from Yaktusk, since the direct route from Lake Baykal such difficulties were encountered. On the report of Tungus that vast rich lands lay south of the Aldan region, Cossack Poyarkov in 1643 undertook the first expedition there with 132 men. From Yaktusk he proceeded along the Aldan and then followed the Aldan's tributary, the Uchur, and then the Gonam. But here winter surprised him on the broad watershed of the newly discovered Stanovoy. The lack of game on the uninhabited ridge of the mountain brought the expedition into very great danger. Death from hunger threatened everyone, and they had to eat tree bark and moss in order to preserve their strength. Despite the great danger Poyarkov succeeded in crossing the watershed on skis, and with the breaking up of the ice he reached the Bryanka, a tributary of the Zeya. Using rafts and boats he himself had made, he went down this river to the Amur, at whose mouth he spent the winter with the primitive fishing people, the Gilyak. In the summer of 1645, using small boats without keels, he proceeded from here along the coast to the north. After a three-month trip with unbelievable deprivations, he landed at the mouth of the Ul'ya, where he encountered Russian settlers and thus was saved. From here he followed the Maya to the Aldan and returned to Yakutsk in 1646. On this hard three-year trip he lost 80 men through illness, enervation, and conflicts with natives. In his description of the Amur country Poyarkov reported on the peoples settled here and mentioned among others the Daur and Gilyak. Of the latter he said that they ate only fish. The Daur, on the other hand, pursued agriculture; barley, buckwheat, millet, peas, and hemp were cultivated. Likewise animal breeding was known to them, they kept horses, pigs, cattle, and chicken. In the woods he found wild walnut trees. All these tribes paid tribute to the emperor of China, who was called Bogdo-Khan. The natives reported that his warriors fought with fire and bows and arrows. 175 484

Three years after the return of Poyarkov, Khabarov set out again from Yakutsk with 70 men on a new exploratory trip toward Amur. He selected a route running farther to the west than Poyarkov had, and he followed the Olekma and the Tungir in order to reach the Amur via the Urka. There he found a large, hostile population ahead of him and, since he felt himself to be too /24/ weak, he turned back to Yakutsk in 1650. However, the next year he set out again with stronger forces, and by the same route reached the Amur on which he founded the city Albasin /today: Khabarovsk?/ at the mouth of a small river. Agriculture was started, and the place itself was provided with buildings for defense. Numerous Russian peasants followed and settled here. However, the still unknown distances and the waiting booty enticed the restless Cossacks. In a constant fight with the Tungus tribe, the Daur, whose cities he pillaged and destroyed, Khabarov undertook numerous trips on the Amur and also followed the Sungari and the Ussuri. He had to spend the winter of 1651-52 at the mouth of Ussuri on the Amur and there he had to defend himself from vigorous attacks by the Manchu and other peoples. The city of Khabarovsk, later founded at the same spot, bears his name.

The first Russians who advanced into the country were free, very bellicose Cossacks; but with them came Russian settlers and traders at the same time. At favorable trade points they established settlements and, in addition to hunting, agriculture, and fishing, they pursued an active, highly profitable fur trade. Over and above this they demanded the usual "yassak" from the natives. These tributes were collected ruthlessly. Robbing and plundering of the sedentary native population were part of the daily agenda, and accordingly many natives, particularly those pursuing agriculture, left the insecure land and resettled on the right side, the Manchurian side of the Amur. 175 167

By the middle of the seventeenth century there were already a whole series of Russian settlements along the Amur; the capital of these was the above-mentioned Albasin /today: Khabarovsk?/.

175 167 All these bases were officially under the Moscow government. Khabarov, who was called to Moscow to give a report, received the title of Boyar. His successor, Stepanov, continued systematically the exploration and taking possession of the land so that by 1681, Russia, for all practical purposes, ruled not only the Amur but also the area around the lower course of the Sungari and Ussuri. The first voivode in Albasin /today: Khabarovsk?/ was Tolbusin. But the behavior of the Russians toward the natives was anything but wooing. Violence and extortions practiced on the natives aroused animosity and led to uprisings, and in the end to battles with the Chinese. As a consequence in the eighties of the seventeenth century all settlements in the entire region were destroyed and most of the Russians were killed. Even Albasin /today: Khabarovsk?/, which had developed into the center of Russian power in the Amur area by continually drawing people in, was captured and destroyed by Manchurian troops in 1684. However, after their withdrawal the Cossacks rebuilt the city and began anew to till their fields. The rapacious border warfare recommenced. Thereupon /25/ a Chinese army with 8,000 men and 40 guns appeared before Albasin /today: Khabarovsk?/ in 1687, while there were only 736 Russians within the city. The Russians, however, succeeded in withstanding all attacks even though at the end only 66 men remained. The others had been killed or had fallen victim to scurvy.

[648] In order to bring an end to these bloody and inexorable border fights, which had taken on the character of a mutual war of extermination, Russia and China resolved on a treaty which was laid down in Nerchinsk on September 7, 1689. The area west of the Argun was promised to Russia, and Russia pledged to withdraw all Russian settlers from the eastern side of the Argun to the western side. The river area of the real Amur was to remain in China's hands. A left Amur tributary, the Gorbitsa, was laid down as the western border, while the watershed between the Lena and the Amur was determined as the northern border: this watershed in the main runs along the ridge of Stanovoy. All Russian settlers in the Amur country had to leave; Albasin was razed and given up.

After the Nerchinsk Treaty the colonization of Transbaykal began. For the protection of the border the Transbaykal Cossack army was drawn up and settled in numerous stations on the Argun, where the Cossacks led an unconstrained border life--half peasant, half soldier. They soon got along well with the Buryat, who had set up their defenses at the time of the first invasion of the Russians. Many Buryat were even taken into the Cossack organization as equals. The Amur country, which remained in China's hands, was not, however, forgotten. With its wealth of furs it soon again enticed many Russians, who advanced along the Amur anew, set up settlements, and with their own hands began to establish themselves economically in the foreign land. The very audacious even ventured as far as the Ussuri country. 175 167

Although the northern border of the Amur country, almost unknown to the Russians and the Chinese equally, had not been laid down exactly and had no border markings, it remained thus for over 160 years. In this period, especially after 1800, numerous Russian scientific expeditions traversed the land. In addition to many well known Russian researchers, such as Maksimovich, Veniukov, Nevelskii, Usoltsev, there also appear many German names of Baltic origin, such as Middendorff, Schrenck, Radde, Schmidt, and Glehn. Outstanding descriptions of the land come especially from Middendorff. At the same time the sea-faring powers began to concern themselves with exploring the northeast coast of Asia. In 1778 Cook traveled the Bering Sea, in 1787 La Pérouse explored the Japanese islands and Sakhalin, and in 1795-98 Broughton worked in the same area. It is interesting that /26/ the poet Adalbert von Chamisso (1815-18) participated in the exploration of Kamchatka and the Aleutian Islands. 175 484

In the geographic research in the Amur country, the question of the mouth of the Amur was of predominant interest, for in this Russia hoped to find access to the Pacific and a favorable harbor. Already in 1777 the far-seeing Czarina Catherine II had, on the basis of the report of the unsuitability of the Sea of Okhotsk, given an order that the Amur mouth be explored. La Pérouse, Broughton, and Krusenstern (1803-1806) had reported that the Amur ended in an estuary, which only in the north had a link with the sea, and this was shallow and not navigable for ocean-going vessels; to the south Sakhalin was connected with the land, i.e., it was a peninsula. In 1846 Gavrilov, who had been commissioned to do exploratory work in this sea area, still confirmed these claims. Nevelskii, a Russian naval officer, turned against this conclusion after practical reflection. He could and would not believe that the powerful masses of water from the immense river, the Amur, should run into an estuary which was almost closed off. It was a dramatic battle which he had to

175 484 conduct against the explorers recognized by the authorities, and he found support from the new Russian governor for East Siberia, Muraviev, who later was made a count and received the honorary name of Amurskii. Muraviev got him command of a small ship, with which Nevelskii headed for the Far East from Kronstadt and in 1849 began his explorations, even before he had received permission to do so. He determined that the connection to the north between the sea and the Amur Gulf could be traversed at all times by ocean-going vessels with a depth of up to 4 meters, and that Sakhalin was an island, and that accordingly during the warm seasons ocean-going vessels with a depth of up to 5.50 meters could get unhampered to the mouth of the Amur from the Sea of Japan through Tatarskiy Proliv /sound/. This news caused a sensation in Petersburg and awakened anew the greatest interest in the Far East both among the state leaders and among the public. In the meantime explorers such as Middendorff, among others, and later also Nevelskii himself reported that the area east of the Lesser Khingan and of the Ussuri had, for all practical purposes, never been brought under Chinese administration and that it was, therefore, in fact free. Thereupon Muraviev took possession of this area and also the Amur country. All of these events are reported in detail, but from the Chinese point of view, by Aitchen K. Wu in his work appearing in 1950, "China and the Soviet Union" (231).

231. Aitchen, K. Wu. China and the Soviet Union (London, 1950).

[448] In 1858 Russia and China signed the Treaty of Aigun, in which the Amur country was declared to be a Russian possession, while the Ussuri country was to be administered jointly by the two countries. But in 1860 in a treaty with Peking Russia also received the Ussuri country and was promised the Island of Sakhalin. With this, all regions which today belong to /27/ the Soviet Union came under Russian administration. In 1860 Vladivostok was founded, in whose name the imperative of Russia's Far Eastern policy was expressed: "Rule the East! "

General Survey

133 Transbaykal, like the other border areas in the Far East, belongs to the east Siberian mountain country. In contrast to the other

133 parts, Transbaykal has a generally regular shape. Numerous mountain ridges traverse it in strikingly parallel strips from southwest to northeast. Extended mountain ridges and almost equally long valley depressions constitute the distinguishing features here, while the contrast between mountains extending irregularly and lowlands lying in between is characteristic of the Amur and Ussuri areas and also of the extreme northeast.

133 Transbaykal, lying between heavily forested, damp Siberia and the dry steppe belt of upper Asia, forms a transition area in terms /137 of its landscape. The Mongolian steppes, which in strips are semi-wastelands, cross the border from the south and in long tongues stretch into the broad valley plains between the mountain ridges. In this fashion the steppes reach even Lake Baykal and form islands in the middle of the wooded area, for example on the Barguzin River and in the valley of the Upper Angara. On the other side the Siberian taiga presses in on mountain ridges far toward the south to the area around the upper course of the Onon and the Ingoda. Thus the Central Asiatic steppe and the north Asiatic continental forest penetrate into Transbaykal. There comes into being a magnificent forest steppe landscape. In the south the steppe predominates, but the farther north one goes the more the forest descends the slopes from the rounded-off mountain ridges until finally the forest fills the ever narrowing valleys. The steppe valleys gradually become grassy meadows, which finally turn into swampy valley meadows and even into swamp forest in the north.

133 The ground relief in Transbaykal, however, is not so varied as would appear from first glance at the map. The valley plains lie generally 600 to 900 meters above sea level, and the ridges of the mountain chains are between 1,000 and 1,400 meters high, so that accordingly there is only a relatively slight difference in height. And even this is blurred by the fact that the slopes are contiguous and rise only very slowly and gradually. As a rule they show no strongly marked ridge but more often have a long, rounded ridge, indeed often in the form of a plateau. In this the predominant forest covering contributes to leveling the unevenness of the relief. Individual mountains, in their considerable absolute heights, extend beyond the tree line. Mostly there are roots, which have withstood the storms and which with their naked round forms project like bare skulls above the general /28/ thicket of trees. The appearance has brought to them the appropriate Russian name of "gol'tsy" (singular -

133 "golets"), which means the same as "baldy" or "bald-head." These goltsy, which appear in Transbaykal only in individual instances, are extremely typical for all mountain areas in the Far Eastern region.

101 311 Culturally, too, Transbaykal has to a remarkable degree a transitional character. The steppe regions, the steppe valleys, and the steppe islands have since time immemorial been the seat of nomadic cattle-breeders, in this case the Buryat, an intelligent and energetic tribe of Mongols, who have kept themselves on the steppes which suit their nature and culture. It is interesting to determine how exactly their expansion even today coincides with their natural landscape. The Buryat penetrate only rarely into the forest areas; more often they leave these to the forest peoples of the Tungus, who even today live there still as hunters and reindeer breeders. The Buryat were the first people to give successful resistance for a time to the invading Cossacks, but as nomads they later had to clear the field for the Russians who were seeping in slowly and pursuing agriculture. Buryat helped themselves, however, by adjusting: they often went over to agriculture themselves, and they appropriated for themselves the advantages of Russian culture. Thus, even though they were penetrated by Russians, they were able to retain their original regions and to attain a cultural level which raised them above all their Mongolian tribal brothers on the other side of the Soviet Russian border. Because of the invasion by the Russians, there came into existence here a cultivated landscape which was inserted between the completely forested areas in the north and the pure steppes in the south; but corresponding to the spacious transition region, this cultivated landscape did not appear in a clossed-off zone, but in culture islands. In extensive regions in the south near the border, the Buryat even today still lead their old nomadic, cattle-breeding life.
132 The fact that the bulk of the rainfall occurs in the summer is favorable for agriculture. Chita, lying in the middle of the land, has an annual rainfall of only 319 millimeters. However, 289 millimeters of this falls during the vegetation period so that a relatively sufficient
243 amount of dampness is available, in conjunction with continental warmth, to make possible a very high yield of summer wheat. This makes Transbaykal an important wheat producer and the principal supplier for all of east Siberia.

133 The Amur country is adjacent to Transbaykal, without a clear border, north of the northern arc of the Amur. In its large morphological traits it is no less varied than Transbaykal, though the differences in

height are greater; for in the Amur country the bottoms of the valleys sink to between 500 and 200 meters, while the mountain ridges still retain heights between 1,000 and 1,500 meters. The number of mountain ridges, which retain their rounded-off, plateau-like character with numerous "gol'tsy" /29/ set on them, decreases. Likewise there disappears the parallel lining up of the main chains in a northeastern direction, a trait which is so marked in Transbaykal. The main mountain chains in the Amur country, on the contrary, run predominantly from west to east, while others cross them almost at right angles. Thus, in contrast to Transbaykal, the geological features have greater dimensions here, where broad plains are inserted between the individual mountain chains, and toward the Amur these plains assume the character of low plains. The thickly settled Zeya-Bureya Plain should be mentioned first. But here too the corresponding traits appear which--apart from the mountains--are expressed in the main direction of the rivers and their valleys. A southwest-northeast direction (like Lake Baykal), such as occurs in the course of the Argun, the Selemdzha, the Bureya, and the lower course of the Amur, crosses a northwest-southeast direction, which appears most clearly in the middle course of the Amur and in the direction of the Gilyuy. Many rivers, such as the Zeya, follow first one direction and then the other. /133

The difference in the landscape from Transbaykal is great since the Pacific Ocean has a powerful effect on the Amur country which lies in the sphere of the east Asiatic monsoon. The nearness of the great continental mass, to be sure, brings harsh winters; but the summer is warm and brings at the same time heavier rainfall than in Transbaykal. Generally the annual rainfall is more than 500 millimeters, of which usually more than half falls in the three summer months of June, July, and August alone and brings forth a most luxurious plant growth. While in Transbaykal the valley areas remain free of tree growth because of the dryness, here there is excessive dampness, which makes it impossible for forests to thrive in the valleys, meadows and level areas. This excess of summer rain gives the landscape its special stamp. Swampy reed thickets along the rivers, broad meadowlands covered with high grass and lying on the higher plains, giving way to little woods on the dry hills, and on the slopes and ridges of the high mountain chains forest thickets often difficult to penetrate and, in contrast to the Siberian taiga, containing oaks and deciduous trees--these are typical of the entire Amur country. /132 /137

The excess of dampness in vegetation season is a handicap 000

311 The excess of dampness in vegetation season is a handicap
even for agriculture and makes difficult the extension of the cul-
tivated areas. New land for cultivation must as a rule be won
laboriously from nature by drying it out. More and more the ex-
tended Zeya-Bureya Plain and the area along the Amur have be-
[162] come quite thickly settled, and large parts of the famous "Amur
Prairie" have been transformed into cultivated land,]It is pre-
dominantly Russians who live here. The Chinese who immigrated
here earlier have been pushed back over the Amur--in part by force.
In all the rest of the area, however, /30/ untamed nature dominates
the landscape, which is traversed at most by a few Tungus or Russian
316 hunters. A wealth of gold has lured numerous Russians into this
wasteland, too, especially in the area around the upper courses of
the left tributaries of the Amur. A locally very active gold in-
dustry has come into existence, which today is organized by the
state and which has drawn even this distant region into the economy.

133 The Ussuri country is divided into two completely different parts: the huge mountain mass of the Sikhote-Alin', which fills the entire area from the Bay of Peter the Great in the south to the mouth of the Amur in the north; and the Ussuri-Khanka lowlands, which extend west of the Sikhote-Alin' in the same direction and continue south of the Khanka Lake without marked interruption as far as the Bay of Peter the Great.

The Sikhote-Alin' is a forest-covered, strongly valleyed /zertaltes/ mountain mass, which is divided into several ridges running parallel to the coast. The shapes of the mountains are soft without especially marked edges and projections. More often plateau-like shapes predominate here, too. The heights in general lie between 650 and 850 meters; the valleys, however, are deeply carved out. Rising slowly from the west, the mountain mass descends steeply to the sea and only rarely leaves free a narrow coastal indentation plain on which there arises small, poverty-stricken fishing villages. The nearness of the sea crossed by a cold stream causes a cool, foggy, rainy, unfriendly summer, thus producing similar conditions to those found on the entire coast extending to the north beyond Okhotsk. Swampy valleys and forests dripping with a cool dampness and with a more northern stamp are typical marks of this area.

132 The western side of the Sikhote-Alin' and the Ussuri-
137 Khanka lowlands, on the other hand, correspond more to the Amur
country. Warm to hot summers joined with high rainfall and a

strong inclination to marshiness are distinguishing marks for this area. 132
The Sikhote-Alin' stretching parallel to the coast keeps back the 137
coolness and also the fog from the sea and allows the sun to have a stronger effect. Everywhere the more southerly position makes itself apparent. In the forests of Sikhote-Alin' deciduous trees appear more and more in the foreground, increasing toward the south, until finally, in magnificent specimens, they form the sole type of tree.
In the cultivated zone, too, which stretches along the entire lowlands, 311
typically Manchurian-Chinese plants become noticeable in increasing [241]
measure toward the south. Kaoliang and other millet, soya beans,
and rice appear noticeably on the scene. There is a change in the 162
population, too. In the northern part of the lowlands, as far as Khanka Lake, Russians and Ukranians predominate; in the extreme south, Chinese and Koreans are in the majority. The Ussuri-Khanka lowland is relatively thickly settled, the Sikhote-Alin' itself, on the [316]
contrary, is in large areas as good as uninhabited, except for some mining areas in the south, where /31/ coal primarily is mined. Native Tungus traverse the Sikhote-Alin' in smaller numbers than in the old days, and in addition there are Russian hunters and Chinese collectors, who are looking for secret, legendary plants.

Sakhalin Island stretches over 950 kilometers in a meridional 131
direction. The southern part is traversed by two parallel mountain ridges, which are separated from one another by a relatively wide depression. The eastern mountain chain is shorter but higher, and its peak of 2,013 meters is the highest elevation on the island. Toward the north the mountain ridges flatten out and give way to a hilly plain. The cool, foggy air masses blow unhampered over the land here, while in the south a difference in climate is caused by the mountain chains. The eastern slopes are cool, rainy and unfriendly, while the western side appears somewhat milder. The southern parts of the island, which were Japanese from 1905 to 1945 and only now have again become Russian , are generally more favorable. In terms of its landscape, Sakhalin can be designated a damp, cool, forested mountain country, but in numerous places treeless moss steppes appear, which recall the tundras of the north. Once feared as a Russian prisoners' colony, Sakhalin is advancing economically more and more because of its petroleum and coal resources.

The Okhotsk coastal area begins at the Uda Bay and encom- 133
passes, in a narrow coastal strip, the Sea of Okhotsk as far as Penzhina Bay in the extreme northeast. In the western part, which stretches

133 from the Uda Bay approximately to the harbor of Okhotsk, the mountainous rampart of the Dzhugdzhur runs parallel to the coast, to which the mountain descends steeply and abruptly. Only seldom does a narrow coastal margin offer an opportunity for establishing a fishing settlement. The way from the coast into the interior of the land is extremely difficult, for only narrow river valleys, etched out like ravines, are available for this: these rivers hasten over their short course into the sea from the ridges of the mountain rampart. For this reason Ayan, the sole harbor on this coast, can't develop. Only near Okhotsk does the foreland broaden into a coastal plain and offer easier routes into the interior of the land. The eastern part of the coastal region from Okhotsk to Penzhina Bay is, on the other hand, very much broken up and has numerous peninsulas and off-shore islands. Here the spurs of various mountains run into the coast almost at right angles, and in between extended, gently rising valley areas extend into the interior. The manifoldness of the formations is increased more by a mountain chain which, running parallel to the coast, appears only in the peninsulas. In terms of its landscape the coastal area presents the same face everywhere. Thick forests cover 133 the slopes and fill the deeply cut-out valleys of the numerous rivers 137 and brooks, most of which are short and which flow into the sea. On the higher tops and mountain ramparts, however, tree growth can no longer develop. Crippled shrubs or /32/ more often moss blankets cover these areas, while the highest projections, like bare gol'tsy, extend beyond the vegetation line.

From the northeastern end of Penzhina Bay a broad lowland extends to the northeast into the interior of the land and continues into the Anadyr' lowland, interrupted only by a narrow watershed-crossbar, which is at most 500 meters high. The Anadyr' lowland opens to the east on the Bering Sea. Both the Penzhina and also the Anadyr' lowlands are very much broken up by numerous mountain and hill ridges projecting into the lowlands. In terms of landscape they both have the same stamp. In the higher areas between rivers broad moss tundras cover the land. However, large poplar forests extend to the rivers, and these forests turn into fir-pine forests in the mountainous border areas beyond the upper courses of the rivers. In general one can consider the landscape to be a wooded tundra.

In the north the Anadyr' area is adjacent to the Chukchi 133 Peninsula. Although the peninsula's coasts are very well explored, its interior is still fairly unknown. Two rubble-covered mountain

chains traverse it from west to east, and these mountain chains with 133
their spurs in part reach the coast, where they break off sharply. But
this area also does not lack plains, for plains extend from the coast
into the land on both sides of the rivers.

All these areas* are either very little settled or are completely 311
uninhabited. Of the Russian coastal settlements only Okhotsk and
Magadan as harbors have a certain importance. Worthy of note is
the reindeer breeding of the Chukchee on the peninsula named after
them.

South of the Anadyr' lowland rises the Koryak Range, which 133
fills the entire area as far as Korff Bay. Some mountain ridges, only
a little separated from one another, traverse the land in a wide arc
from the southern end of the Anadyr' Bay in the direction of the
Kamchatka Mountains. Only near the coast have the rivers dug out [137]
deep valleys; here forest growth appears, while the high areas and
the ridges are covered by pure tundra.

The coast of the Bering Sea has numerous native and Russian [361]
fishing settlements; the hinterland, on the other hand, is occupied
only by small Paleoasiatic remnant peoples, who pursue reindeer
breeding.

Kamchatka Peninsula is one of the most interesting regions
in the Soviet Russian Far East. The relief, which just like Sakhalin
gets its main characteristics from two mountain ridges, is extraordinarily
varied, for numerous young volcanos are set on the mountain
ridges, and a number of these volcanos are still active. The
Klyuchevskaya Sopka, the highest volcano on the peninsula, rises
from the valley of the Kamchatka River to a height of 4,775 meters
and makes an imposing picture with its ice-capped peak. Because 137
of the abundant rainfall and the mild climate, the plant covering of
the peninsula is very luxurious. On the outer mountain slopes deciduous
forests predominate, only /33/ in the interior of the peninsula do fir-pine
forests appear. The only exception on a larger scale is the west
coast, on which tundra-like moss steppes have developed. In addition 162
to numerous Russians who occupy primarily the coastal fishing villages, 361
the Paleoasiatic Koryak and Kamchadal have remained in the interior.

The volcano belt of Kamchatka continues toward the south
in the island chain of the Kurils, which after World War II went to 133
the Soviet Union along with the southern half of Sakhalin Island.

* [i.e. the Okhotsk coastal area and the Anadyr' area -- Analyst]

3: Thiel--26 K-4,5 (no date) 1953 RR1 Siberia RR1

Geological Structure and Morphological Formation

/33 The geological history of the entire Far Eastern region is determined by the "Old Siberian Mass." The Angara country forms the core of this shield which was already rigid in the earth's early history. Around this old, early stiffened mass, resisting all orogenic movement, the earth's crust laid itself in broad fault zones, which, although with interruptions, belong to more recent periods the more distant they are from the old mass. Accordingly we see the most recent Tertiary mountain formations appearing only on the extreme rim on Sakhalin and Kamchatka. These folds have a second result of extreme importance for the morphology of the entire area: every younger orogeny, through its powerful tectonic pressure, destroys the older, already non-active fault and stiffened zone and leads to the formation of breaks and vertical displacements, and indeed often to over-extensions /Überschiebungen/ on the edges. Since in this regard every new fault exerts its effect internally toward the old mass, the result is that the degree of disturbance and breaking up of the old mountains into individuals masses, clods or horsts decreases toward the outside, and accordingly fault mountains have preserved themselves the best in the outer border zone. If individual details are overlooked, these large traits of geological structure appear throughout the land.

Transbaykal for the most part belongs to the oldest part of the continent, the "Old Summit of Asia," as Suess named it. Already in Pre-Cambrian times a mountain arose here with narrow, steep faults, which in the area discussed ran from southwest to northeast, i.e., in the direction which Lake Baykal runs. Strong wearing away lowered this mountain into a mountain root /Gebirgsrumpf/, almost a plain, which then later was broken up into individual parts by disjunctive movements, especially by breaks. The horst and graben formations produced thereby are of striking importance for the morphology and hydrography of the land. The mountain ridges which we encounter today in Transbaykal, are nothing but standing or elevated horsts, i.e., remainders of Pre-Cambrian mountain roots. In this the shield movements, which were repeated in several phases until Post-/34/ Tertiary times, have kept constant the strips in the line of Lake Baykal which have been predominant since Pre-Cambrian times. Marked by the old fault mountains, all tectonic lines extend from southwest to northeast. From this results long horsts and grabens, which can often be followed through all Transbaykal. Only seldom are they crossed by diagonal depressions and slight diagonal sills. Lake Baykal belongs to the most recent breaking-in of the region. It is certain that it already existed in the Miocene period, although its final formation took place only in the late Tertiary era through the elevation of its surroundings. Its basin consists of four grabens, of which three extend in the same direction as Lake Baykal, while the most southern one follows the course of the Sayan. The Sayan Range, which is faulted onto the southwestern border of the Angara Mass, shows in its oldest structure a construction similar to the old Baykal Mountains, but it is somewhat younger. It stretches from northwest to southeast and thus runs into the Lake Baykal direction almost at right angles. This direction of strips is generally designated as the Sayan direction. Only the spurs of the Sayan extend into Transbaykal. It is still not clear whether the Sayan direction bends here into the Baykal direction or whether the two, coming together here, run out toward the south.

In the horsts of Transbaykal there appear everywhere on the surface bare deep stones /Tiefengesteine/ of the primitive mountains, especially granite, syenite, gabbro, and in addition to these there are metamorphic rocks of Pre-Cambrian times, especially gneiss, crystalline slates, marble, and quarzite. These stones determine the predominantly soft morphological forms of the flat ridges, from which here and there individual cores project from the rounded tops. Where, however, effusion /Erguss/ stones, especially porphyry and porphyrite, have participated in the formation of the surface forms, the formation is more lively and more varied. The 2,508 meter high Sokhondo in the area around the source of the Ingoda is from porphyry and its tufa and downright Alpine mountain forms full of valleys. Basalt extends over a larger area only in individual grabens, i.e., on the upper Vitim, in the Tugnuy trough, between the Tsagan-Daban and the Saganskii Mountains and in the Khilok graben. In general basalt effusions resulted. Only on the upper course of the Vitim do the eruptions in the Obruchev, Mushketov, and Lopatin volcanos have outspoken crater forms, which project from the surroundings, however, only about 100 to 160 meters.

Toward the northeast the internal horst region of Transbaykal turns gradually into highland-shaped formations. On the Vitim Plateau, the first representative of this region, whose high plain-like character is strengthened by the basalt covering laid over it, additional mountain ridges with similar surface forms are adjoined. In general the Transbaykal character is preserved. Here, too, Pre-Cambrian rocks form the base of the extended horsts. Wide grabens, however, are lacking. As a consequence, the results of the /35/ forces of water, ice, and wearing away by frost, forces whose shaping effects have occurred more recently, can be observed much more clearly. Typical are the deeply-etched valleys, which follow the break-lines but often likewise go their own way. Also the strips going in the Lake Baykal direction can be followed everywhere in spite of the high plain character. In the Patom Plateau, however, north of the lower course of the Vitim, this clear unequivocalness disappears. Probably the basic mass of the plateau consists overwhelmingly of metamorphic stone series of Pre-Cambrian times, and the main fault is Pre-Cambrian, but the lines stretching in the direction of Lake Baykal are lost here. In a sharp curve, convex toward the north, the fault turns to the east and east-southeast. The damming-up effect of the archaic Aldan mass makes itself noticeable; the Aldan mass like the Angara country, belongs to the core of the Siberian primeval shield. The faults extend along the southwest and southern border of the Aldan mass until they experience a strong demolition east of the Olekma in the zone of the Stanovoy Range.

The horsts of the high plain region mostly project more markedly than in the actual Transbaykal area. Generally they are between 1, 000 and 1, 500 meters high, and projecting above them up to more than 2, 300 meters are numerous mountain cores consisting predominantly of intrusive stones. Of economic importance is the fact that the old Proterozoic masses conceal numerous ore deposits. The richest gold mines in the USSR lie in the area of the Vitim and the Patom. Besides the gold-quartz veins still existing, gold is found in the perma-frost diluvia metals and sands of the river valleys, however, mostly secondarily.

The system of the Stanovoy Range begins east of the Olekma and north of the mouth of its tributary the Nyukzha. This mountain range forms the southern Proterozoic border of the Aldan mass and because of the resistance of the latter, this mountain range forms the continuation of the Transbaykal root plain, bending somewhat toward the south. Stretching out in many places are the old faults which form the trunk, but these faults extend from southeast to northwest so that the tectonic and orographic stretches /Streichen/ do not always coincide. A similar stretch of Pre-Cambrian faults from southeast to northwest can also be seen in the area around the upper course of the Olekma in the north of the large Amur arc. Also the trough points

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to tectonic tendencies in the same direction, as does the course of the middle Vitim. The coming into being of the Stanovoy Mountains was therefore completed in part independently of the direction of the old faults and goes back to later breaks with horst and graben formations; in this the abutment of the Aldan mass became decisive for the present orographic stretches /Streichen/ of the system, which extends from west to east in an arc which is slightly convex toward the south. In connection with the breaks there has also been the thrusts of eruption stones which extend especially on the northern border and which have caused steep mountain forms to come into being locally. The real ridges have a high plain character and generally lie 1,200 meters above sea level. The highest point, north of the /36/ source of the Zeya, attains a height of 2,482 meters. Typical of a large part of the Stanovoy Range is a sloping to the south in gentle steps.

The Stanovoy Mountains extend to the east as far as the Maya, a tributary of the Uda. To the east they adjoin the Dzhugdzhur Mountains, which extend to the northeast as far as the Okhota River on the coast of the Sea of Okhotsk. They are the main chain of three parallel mountain chains, and consist primarily of gneiss, granite, and porphyry. But they also have slate and limestone folded in, whose fauna belong to the upper Devonian era. This brings with it the variegated /variscische/ formation of the Dzhugdzhur, which undoubtedly is adjoined in the west to the older zones, which form the eastern border of the Aldan massif.

Mesozoic fault zones, extending to the Sea of Japan, adjoin on the south and southeast the block of the Pre-Cambrian faulted area in Transbaykal and of the Stanovoy, a block which seems to be a single unit. In individual regions these zones are unevenly developed and are also preserved unequally. Because of the fact that knowledge of this land is still slight, many tectonic movements still can't be ordered in time or limited, and only a general, over-all description can be given.

Following the Pre-Cambrian region is a broad zone of Caledonic and variegated /variscische/ faults, which extend from Mongolia to the Sea of Okhotsk and follow the strip direction of the older zone. The eastern parts, including the middle Amur region, into which the Triassic and Jurassic Sea was able to penetrate, belong to the Cimmerian Orogeny, which probably can be regarded as the most powerful in the Far Eastern region. It penetrates far into the interior and overpowers

133 the preceding older formations more or less strongly, dismembering them into clods /maybe: shields/ and causing rises and depressions. Toward the outside the Cimmerian zone is displaced by the Tertiary, alpidic orogeny. Sakhalin, Kamchata, and the Koryak Mountain Range, which is surrounded by the Penzhina-Anadyr' depression, are considered as belonging to this orogeny. On the continent in the Amur area the Tertiary events produced bends and clod movements.

In the southeastern part of Transbaykal the horst character predominates as it does in the rest of Transbaykal, but the typical graben formation recedes, and the individual mountain ridges are mostly formed by simple dislocations. The stronger tectonic processing of this region goes back to the Mesozoic orogeny which already appears here. The Cimmerian mountain formation dominates incontrovertibly in the Shilka Hills northeast of Nerchinsk. Also further to the south in the Nerchinsk Mountain Range north and east of the Borzya railroad station, there are pre-Jurassic and post-Jurassic faults with northeastern lines, and on the upper course of the Ingoda old northwestern faults appear, which lie under a more recent fault following the line of Lake Baykal. The border of the old Lake Baykal root plain, which was no longer incorporated by the Mesozoic /37/ orogeny, must be sought west of the Nerchinsk-Borzya line.

The Yablonovyy Ridge, which in its entire course belongs to the Pre-Cambrian horst region, extends south of the upper course of the Vitim and its tributary the Kalakan in a northeasterly direction almost as far as the Olekma. North of the end of this ridge individual mountain tops in the Kalar Mountain Range reach considerable heights (Golets Skalistyy 2,800 meters; Golets Snezhnyy 2,515 meters). These regions, to which the Olekminsk Stanovik in the area around the upper Olekma also belongs, are still incompletely explored. Brief mention can be made of this latter area.

The Stanovoy Range declines toward the south into the upper Zeya Plain, which continues toward the west in the Gilyuy Valley at the foot of this mountain range. This valley is a large graben depression, which is filled with gold-bearing river beds. Its center is 329 meters deep. On the south the depression is closed off by a long mountain chain, which runs from west to east analagous to the Stanovoy. This is the Tukuringra-Dzhagdy Mountain Range. The Yankan Ridge acts as the connecting link to the west with the Olekminsk Stanovik. The entire mountain chain consists primarily of gneiss, granite and crystalline slates. However, it has been confirmed that Paleozoic elements are included in the fault, and accordingly the Pre-Cambrian age assumed earlier probably does not apply to the entire chain. Local break lines traverse the mountain mass and follow it especially at the southern foot. The wave-like upper surface is heavily eroded, and projecting beyond it to heights up to 1, 600 meters are numerous tops of mountain cores. The height of the central pass is between 900 and 1, 000 meters. The Tukuringra Mountain Range is bored through on the south by the Zeya River, the sole drain from the closed-off graben depression, which is named after it /i. e. Zeya/. Terrace formations point to more recent vertical movements. From the River Dep, a left tributary of the lower Zeya, the mountain chain bears the name Dzhagdy Mountain Range. It is connected with the Stanovoy by a broad, high ridge, which cuts off the upper Zeya Plain on the east; generally in the Dzhagdy Mountains the two main strip directions to the northwest and the northeast are manifest and cause the winding course of this mountain range. Its ridge forms the watershed between the Uda, flowing into the Sea of Okhotsk and the Selemdzha belonging to the river area of the Zeya. The region of the source of the Selemdzha is surrounded almost concentrically by high mountain ridges, which form the northern part of the Bureya Mountain country.

The Bureya Mountain country comprises the entire region of the river of that name, and in addition sends out spurs to the lower Amur and the Amgun'. In it the strip direction toward the northeast is again clearly manifest both in the Turan Ridge west of the river and especially also in the Bureya Mountain Range, the backbone of the entire mountain country. The Bureya Mountain Range is a continuation of the Lesser Khingan lying in the Manchurian area, and is therefore often also designated by the same name in Russian territory. The Amur cuts through /38/ the mountain chain in a more then 150 kilometer long valley, which is often scarcely one kilometer wide and which is lined by high rocky banks. Here on the Amur, the Bureya Mountain Range is only 200 to 500 meters high, but it rises toward the north, where between the area around the source of of the Selemdzha and that of the Bureya it has the greatest elevations in the area with heights of 2, 155 and 2, 119 meters. Here parts of the mountain chain also have special names locally, for example the Duse-Alin, which surrounds the source area of the Bureya, and the Yam-Alin, which is up to 2, 000 meters high. In addition to the gneiss, grantite, and metamorphic slates, there are extensive deposits

133 of porphyry and diabase, and in the south Jurassic sediment especially. The valley of the Bureya has extensive deposits of strongly dislocated Jurassic hard coal. The ridges often have the character of greatly cut up high plains.

The wide plain on the middle Amur is divided into two parts by the lower course of the Zeya. West of the Zeya stretches the Amur-Zeya Plateau, to the east is the Zeya-Bureya lowland. The first is a high plain, which generally lies 250 meters high and consists of flatly laid out Jura and brown coal-bearing Tertiary; this high plain bends gently from northwest to southwest. The watershed areas are very flat; the valleys, on the other hand, are deeply etched. On the steep banks of the Zeya the Tertiary, reckoned from the river bed, has a thickness of 150 meters. Therein appears in many places granite, gneiss, and, in some places, porphyry, melaphyre, and basalt. The area between the Zeya and the Bureya is higher in the north and has here a hilly terrain. On the left side of the Zeya and along the Amur extending beyond the mouth of the Bureya to the east is a pronounced lowland, which is principally filled with recent Tertiary deposits. In open lodes of individual hills, however, old stones appear, too. The entire region of the middle Amur owes its present form to an incurvation in large waves of the root plain in the Tertiary period. However, still later vertical movements occurred, too, as is indicated by four clearly formed terraces both on the Zeya and also on the Amur. The highest lies 100 to 120 meters above the present level of the lower course of the Zeya.

The region around the lower Amur, which begins at Khabarovsk, can be regarded as a long graben depression between the Lesser Khingan and the Bureya Mountains on the one side and the Sikhote-Alin' on the other. The region north of the lower Amur which has still been but little explored is very much broken up. Here, too, the faults stretch predominantly toward the northeast as in the Bureya Mountain country, but the disturbance of the structures, which go back to two variegated phases following one another, is extraordinarily great. The bays south of the Shantar Islands can be regarded as graben break-ins, while the islands themselves, which are formed from slate and granite, are remaining horsts.

Actually the lower course of the Amur, comes very close to the sea with its Kizi and Kada lakes. But after a turn to the north, it takes in the Amgun, making a sharp /39/ turn to the east, where it empties into the sea. This phenomenon can be explained by andesite and basalt overflows, resulting here from the formation of the Sikhote-Alin' and by later crust movements.

The Sikhote-Alin' is a mountain block surrounded on all sides by breaks. Only in the south is there a covering formation. The main fault with overextensions toward the northwest occurs in the Lower Cretaceous /Unterkreide/. The faults stretch toward the northeast to east-northeast. Steep breaks occurring later have cut up both the Sikhote-Alin' and also the Ussuri country and led to rises and depressions. The main break lines follow the lines of the mountain faults. Thus the Ussuri depression came into being as a break-in. The coast, too, came into being through a breaking-off. In the north, opposite Sakhalin, however, the coastal break line bends toward the north and converges here with the lines of the faults. In the south the Sikhote-Alin' ends with a cross break. The following facts on stone composition are of greatest importance for the present surface forms. In the central and also the border sections, granite predominantly forms the oldest layers. It appears in the old surfaces and in the lower slopes as a pronounced massif, while the flanks mostly are covered by younger, heavily faulted and destroyed stones--in the west predominantly by crystalline slates, gneiss, micaschist, and quartzite; in the central part predominantly by phyllite, argillaceous schist, silicious schist, and sandstone. Of the effusion /Erguss/ stones, porphyry as a rule forms the numerous round tops, while basalt is represented in the extended cover effusions. The southern part of the Sikhote-Alin' is differentiated from the northern by the appearance of overextension covers /Überschiebungsdecken/. In numerous places, especially on high mountains, marbled limestone of Permo-carboniferous age, forming thick layers, lies in the form of individual clods. Also the northwestern topplings over of Jurassic and Triassic point to over-extensions /Uberschiebungen/. These must have occurred in the period between the upper Jurassic and the Miocene and have come from the direction of the Sea of Japan. The surface forms are predominantly of a single form. Long, vallied ridges with tops set over them, and winding, unequally formed valleys, often with convex slopes, are characteristic. In the basalt coverings the rivers have dug deep, canyon-like valleys. Of significance for the newer relief formation are the vertical movements, begun in the Diluvia age but still not completed at present. Broad abrasion terraces lie near Vladivostok reaching heights of 10, 30, 50, 120 meters and, in individual places, up to 300 meters. At present the southern coast is sinking while the east coast apparently is rising. A consequence of the old and late Diluvia elevation is the crooked position of the entire Sikhote-Alin' block with its inclination toward the interior of the land.

The alpidic fault zone is limited to the extreme outer areas and is retained only in fragments. From there arise indications of two large fault arcs. The western one appears on /40/ Sakhalin and reappears apparently on the northern coast of the Sea of Okhotsk in the Chutkavar Hills west of Magadan and on the Koni, P'yagina and Taygonos Peninsulas, to circumscribe the Penzhina depression on the west and the Anadyr' lowland on the north in a swinging arc. Kamchatka, along with the Koryak Mountain Range adjoining it on the northeast, forms the core of the second arc, while the Kuril arc is a continuation toward the south to the Japanese Islands, where the two fault arcs come together on Yesso Island. The western arc is distinguished from the eastern one by the lack of active volcanos, which distinguish Kamchatka and the Kurils especially.

On Sakhalin continental formations alternate frequently in the sediments of the Upper Cretaceous /Oberkreide/ and thus indicate that the island is located on the border of a geosyncline. The two mountain chains, which are separated by the long Tym and Poronay depressions filled with marine recent Tertiary, differ substantially from one another. The eastern mountain range projects up to 2, 013 meters and shows break and shield formations in addition to an older, probably variegated /variscischen/ fault with heavy intrusions. The western mountain on the other hand consists only of more recent rocks, especially Upper Cretaceous and Old Tertiary. The Tertiary fault stretching meridionally repeats, therefore, the variegated /variscische/ direction visible in the eastern range. The faulting is irregular in individual places and decreases toward the north. Of the three Tertiary phases which are distinguished, the youngest is expressed predominantly in long breaks with effusions both on the west and on the east coasts. The vertical movements appearing with these have lasted up to the present. In this the northern tip of the island is sinking, while in the middle of the island marine Quarternary has risen up to 150 meters and five beach terraces are visible on the banks.

The structure of Kamchatka is similar to that of Sakhalin. A break-in zone running approximately toward the north-northeast, and containing the Kamchatka River which flows from the south and the

Yelovka which comes from the north to meet the Kamchatka, divides two mountain chains, which run parallel toward the north-northeast in the same direction. Also on Kamchatka, in the eastern part, there are remains of an old Caledonic or variegated /variscischen/ zone, whose faults, however, extend toward the northwest and meet the Tertiary faults at right angles; this, as well as other causes, explains the destruction which is so pronounced even for the east. The western range is a 1, 000 to 1, 200 meter high middle mountain range. Basically it consists of crystalline slate and phyllite, on which sandstone and slate, presumably of Paleozoic age, are deposited, and of Upper Cretaceous and Tertiary from Oligocene to Pliocene with heavy effusions, which are faulted several times with north-northeast strips and overextensions toward the southeast. West of this mountain chain stretches a cut-up coastal table, elevated to 600-750 meters and consisting of dislocated marine Pliocene deposits, partly also of Upper Cretaceous; this coastal table slopes to the Sea of Okhotsk /41/ in several beach terraces. This coastal zone, too, appears to lie in gentle waves and is broken through by isolated elevations consisting of eruptive rock. The western chain conceals numerous extinguished and heavily destroyed volcano ruins. In the center rises the 3, 607 meter high Ichinskaya Sopka with its mighty dome and some sloping glaciers. It is the only active volcano in the western half of Kamchatka, and its crater constantly expels clouds of smoke. In contrast to the straight, elevated west coast, the east side of Kamchatka is much broken up by numerous break-in basin-shaped valleys. The eastern mountain range is very heavily destroyed, in many places overlaid by volcanic masses; and therefore only fragments of the original structure are visible. Granite and crystalline slates are indicated here as Proterozoic. The tectonic action /Durcharbeitung/ is so strong that even the Pliocene is shoved over /überschoben/. Connected with this destruction are the especially heavy volcanic formations on the eastern side of the peninsula, and in this the eruptions as a rule follow the great breaks, which run perpendicular to the faulting. Of the 127 known volcanos, 74 are recent volcanic formations, and of these 18 are still active today. The most important is the immense, regular andesite basin-shaped cone of the Klyuchevskaya Sopka which has a height of 4, 775 meters and is covered down to 1, 500 meters with perpetual snow and glaciers. The Commander Islands also have recent volcanos. Tertiary is also found on them.

Kamchatka Peninsula is connected with the mainland on the north only by a narrow plateau which is up to 155 meters high, the Parapolskii-Dol, which was elevated only in recent times. North of this narrows stretches the Koryak Mountain Range, which really is a broad zone and which with its mountain ridges continues the faults of Kamchatka in the same direction. The three known main chains, the Palpal, the Tingeney, and the Rarytkin, consist, according to knowledge to date, of Cretaceous and Tertiary deposits with basalt eruptions. The present formation of the area appears to go back more to more recent clod /Schollen; maybe, shield/ movements, which were their strongest in the Diluvia and which gave rise to dispersals and even block overextensions /Blocküberschiebungen/. Elevation dominates on the coast today, too, and on this elevation two elevated beach terraces can be observed. However, the entire area of the Koryak Mountain Range is among those little explored areas, and accordingly further clarification must await the future.

The Kuril arc adjoins the southern tip Kamchatka. Twenty-three islands have volcanos, of which 18 are still active.

Knowledge of the Anadyr' region and of the Chukchi Peninsula is still very slight. Only the coastal areas are better explored. The line of the mountain chains appears to be varying and is influenced by an older core of the "Chukchi Mass" lying in the north; around this mass the mountain chains order themselves in a similar fashion to the way they do around the old Angara mass. /42/ Thus a main fault line stretches approximately from west to east through the Chukchi Peninsula, and this line apparently consists of two chains. Also further south, in the Kolyma area, the chains fit into this order with a line from southeast to northwest. In time these orogenies belong to the Mesozoic.

The Ice Age and Its Traces

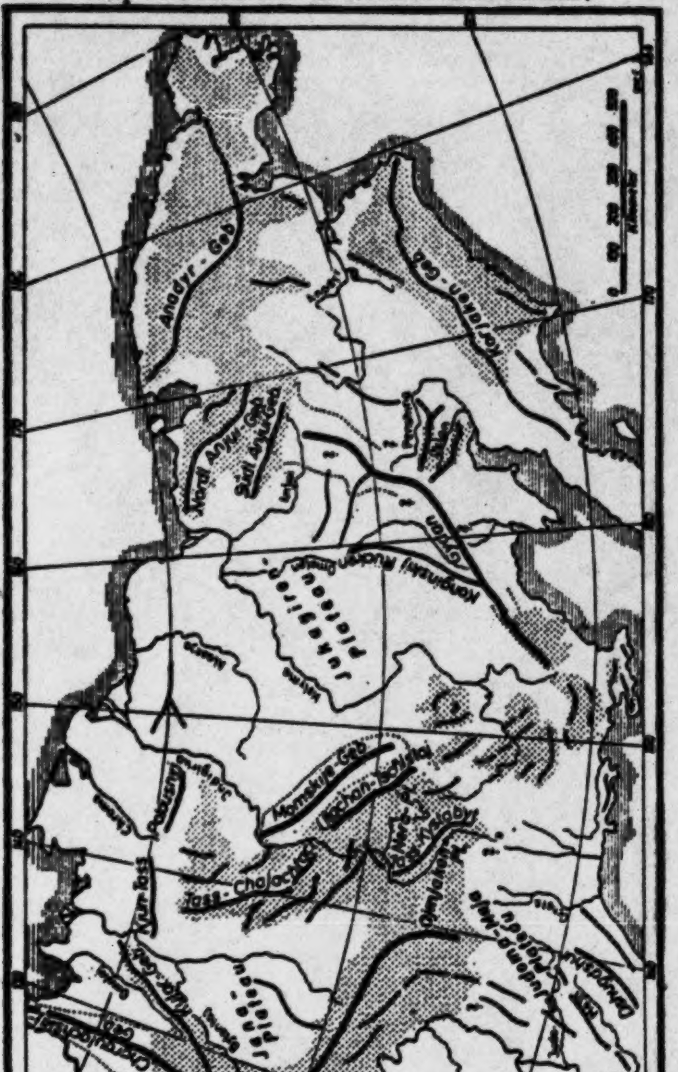
Most of Transbaykal and the Far East was spared the Quaternary glaciation. The nearness of the Central Asiatic heights with land air currents in the winter and with resulting slight rainfall in the cold season may have contributed significantly to this in wide areas of the country, while in others the southern position can be assumed to be an additional reason. Where glaciation was able to form, special local conditions must have led to this, but research still cannot give a final judgment on the reasons for these special conditions. Only three sections were gripped by the glaciation in large measure: the extreme northeast, Kamchatka Peninsula, and the area east and northeast of Lake Baykal. Even in these regions the extent of the glaciation was limited mostly to the mountains and the higher parts of the land, while lower plains remained free of ice; accordingly the glaciation--even though in spots it may have extended over quite a large area--had only a local character here, which cannot be compared with the mighty ice-covering which Europe experienced.

The glaciation of the extreme northeast is related to the similar occurrence in all of northeastern Siberia, and together these glaciations form an entire complex of ice-covered mountains and of ice-free plateaus and plains lying in between the mountains. The area of glaciation extends over the entire area from the lower course of the Lena in the west to the Chukchi Peninsula in the east. The glaciation of this region stands in contrast to the conditions in central Siberia, which remained ice-free for the most part. The next glaciation area is far west of the lower course of the Lena in the river valley of the Khatanga. Thus the northeast Siberian glaciation area forms a specific unit in which the same conditions are predominant. In order now not to remove the areas belonging to the Far Eastern region from this context, since they, of course, constitute only a part of northeastern Siberia, we must be permitted to go into detail on the Ice Age conditions in the entire area in order to get a better survey. But here, too, the limitation must be made that, because of the still inexact investigation, exact details can be given only for individual areas, while in the rest we must be satisfied with a general picture. In this connection mention may be made /43/ /Map of Glaciation in Northeastern Siberia:/ /44/of the author's essay, "Die Eiszeit in Sibirien" in the periodical Erdkunde /Earth Science/ (Bonn 1951, Vol. V).

The glaciation east of the Lena sets in with the arc of Verkhoyansk Mountain Range. This begins in the north with the 1,200-1,300 meter high Kharaulakhskiy Mountain (Kharaulakhskiye Gory), whose spurs extend into the Lena Delta. There is still not general agreement whether or not this mountain experienced glaciation. Some researchers, such as Parkhomenko (149) and Saks (170)

149. Parkhomenko, S.G. Nekotorye dannye o prirode Nizhnelenskogo kraya /Some Statements on the Nature

Map of Glaciation in Northeastern Siberia:


Anadyr - Geb
Korjaken - Geb
Nord Anjui-Geb
Süd Anjui-Geb
Jukagiro plateau
Momskije-Geb
Ulachan-Tschistai
Tass-Cholochtach
Ojmjakon
Kolyma

The dotted areas give a survey of the glaciated regions. Since--apart from the area between the mouth of the Kolyma and the Chukchi coast and the Koryak Peninsula--the glaciation is of the Alpine type, the area appears disproportionately large. The picture is unclear on the mountain ranges outlined by dotted lines. /43/

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of the Lower Lena Area/. Trudy of the Commission for Research on Yakutia, 1928.

170. Saks, V.N. "O chetvertichnom oledenenii severa Sibiri /On the Quarternary Glaciation of Northern Siberia/," Arktika, Vol. IV, 1936.

answer this question with a yes, while others, such as Romanov (160)

160. Prasolov, L.I. Iuzhnoie Zabaikal'ye /Southern Transbaykal/. Material for Ground Research in Asiatic Russia. Moscow, 1927.

and Vollosovich answer this question with a no, although even today the mountain still has ice caps. There is no question about the Orulgan Mountain Range, which extends up to 2,000 meters in height and which adjoins the Verkhoyansk on the south. The Orulgan has incontrovertible signs of an extensive valley glaciation (84). The glaciers

84. Ivanov, A.P. "Novye dannye o geologicheskom stroenii i polesnykh iskopaemykh Orulganskogo khrebta /New Information on the Geological Structure and the Natural Resources in the Orulgan Area/," Problemy Arktiki, No. 4, 1938.

rose from the valleys toward the west where they joined with a foreland glaciation and almost reach the line of the present Lena. On the east they extend as far as the Bytantay, a left tributary of the Yana (170).

170. Saks, V.N. "O chetvertichnom oledenienii severa Sibiri /On the Quarternary Glaciation of Northern Siberia/," Arktika, Vol. IV, 1936.

The Kular Mountain Range, stretching on the left side of the Bytantay from the Orulgan toward the northeast to the lower Yana, has also undergone glaciation, according to Saks. The real Verkhoyansk Mountain Range, which begins in the area around the source of the Bytantay, has heights up to 2,000 meters in the west and toward the southeast rises to heights up to 2,500 meters. It experienced a similar glaciation to that of the Orulgan Range. Here, too, valley glaciation predominantes, but it was stronger and more extensive than that of the Orulgan. The glacier appeared toward the southwest and south and, as a closed foreland glaciation, moved as far as the Lena and the Aldan. Its extreme edge reached a distance of up to 200 kilometers from the foot of the mountain range and descended to an absolute height of 2,000 meters. (74, 137). At the time of its greatest expansion it reached the Okhotsk tract at the passage over the Aldan. Traces of an old glaciation are, according to Saks, also found in the Dzhugdzhur, which stretches along the coast of the Sea of Okhotsk. However, here there is still no exact information on the extent or the type of the glaciation.

The extent of the Verkhoyansk Glacier to the north is still too unevenly investigated to permit final conclusions. Khmysnikov (45) found no moraines on the Yana Highland (Yanskoye Ploskogorye). Better known is the southeastern part, the area around the upper course of the Indigirka. Here between the Verkhoyansk Mountain Range and the chains of the Cherskiy Range lie two highlands, the Oymyakon Plateau (the area around the source of the Indigirka) in the south and in the north the Nera Plateau (Nerskoye Plateau, drained from the Nera to the Indigirka); these two plateaus are separated from one another by the Tas-Kystabyt Mountain Range. The Cherskiy Range, which apart from Kamchatka has the highest elevations in northeastern Siberia (the Gora Chen is 3,114 meters high), has a mighty ice covering,

74. Gregoriev, A. A. Geologiia, relief i pochvy severo-Zapadnoi chasti Lensko-Aldanskogo plato i Verkhoianskogo khrebta po dannym ekspeditsii 1925 g. /Geology, Relief, and Ground of the Northwestern Part of the Lena-Aldan Plateau and of the Verkhoyansk Mountain Range according to the Information of the 1925 Expedition/. Material of the Commission for the Study of Yakutia No. 4, 1926.

137. Obruchev, S. V. Kolymsko-Indigirskiy Kray /The Kolyma-Indigirka Region/ Trudy SOPS, Yakutia Series 1, 1931.

45. Khmysnikov, P. K. Geomorfologicheskii ocherk Lensko-Yanskogo Kraya /Geomorphological Sketch of the Lena-Yana Area/. Trudy SOPS, Yakutia Series 1, 1932.

133 which, accroding to S. V. Obruchev (137), has the character of an inland glaciation. The glacial mass overflows the Nera Plateau (down to heights of 1,000 to 1,299 meters), the /45/ Tas-Kystabyt Mountain Range, which in addition, through its own glacial formation, contributes to raising the entire mass of the ice, and the Oymyakon Plateau (down to heights of 1,500 meters). Here the glacial mass meets with the glaciers flowing toward the north from the Verkhoyansk Range. The entire area between the two main mountain chains has thereby a closed ice covering. The glacial mass on the Oymyakon Plateau is 400 meters thick, according to S. V. Obruchev. (137)

Peculiarly enough the very significant glaciation of the Cherskiy Mountain Range developed only slightly toward the north; the ice masses moving in that direction did not once reach the Momskiye Mountain Range running parallel to the Cherskiy (the river valley of the Moma separates the two mountain ranges). The Cherskiy Range, whose highest elevations project more than 2,000 meters, is supposed, in the opinion of some researchers, not to have been glaciated more, but this is contested by others. Thus, the question of the glaciation of the Momskiye Range still remains unanswered. The Cherskiy Range even today still has glaciers, whose extent, however, it has not been possible to determine up to now. Further north between the Yana and the Indigirka, glaciation of the Tas-Khayakhtakh is still known, and from this range glaciers pressed forward as far as the Indigirka (approximately 68° North). The extreme north, however--the Polousnyy Range--is, according to the newest information, no longer supposed to be covered with ice, despite its height of up to 1,200 meters. (170)

137. Obruchev, S. V. Kolymsko-Indigirskiy Kray /The Kolyma-Indigirka Region/. Trudy SOPS, Yakutia Series 1, 1931.

137. Obruchev, S. V. Kolymsko-Indigirskiy Kray /The Kolyma-Indigirka Region/. Trudy SOPS, Yakutia Series 1, 1931.

170. Saks, V. N. "O chetvertichnom oledenenii severa Sibiri /On the Quarternary Glaciation of Northern Siberia/," Arktika, Vol. IV, 1936.

The mountain chains in the area around the upper course of the Kolyma show numerous and clear glacial traces (the Garmytshan, Arga Tas, and other ranges), but these traces never lie below 500 meters above sea level, and accordingly only a more local glaciation can be assumed for this area. Also the Kolyma Plateau, adjoining it on the north, has only individual local glaciation centers, which extend over slight areas. More detailed information on these regions is not available.

Between the upper entrance area of the Kolyma and the coast of the Sea of Okhotsk, and also in the southern part of the Gydan Mountain Range (also often known as the Kolyma Mountain Range), the glaciation was again greater and attained here the closed form of an ice covering. This occurred especially on the slopes inclined toward the Sea of Okhotsk; these slopes were covered by an extensive glacial mass, which at the time of its greatest size was of the Norwegian type. From the heights of the Gydan /also: Kolyma/ Ridge (2,000 meters) the glacier descended as far as the coast of the Sea of Okhotsk (74, 137). Full glaciation is assumed for the northern Gydan lying in the interior of the country, and this glaciation continued then as far as the Chukchi Peninsula.

In contrast to the relatively heavy glaciation of the mountain ranges, the plains lying inside the arc of the Verkhoyansk and Gydan Ranges were free from every form of ice covering. This applies both to the higher plateaus and also to the coastal plains and the hinterland, areas which morphologically consist of very different units: the depression /46/ of the Omoloy, the Yana, Indigirka, and Kolyma, the Alazeya Plateau (descending to heights of 200-700 meters) on the

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74. Gregoriev, A.A. Geologiia, relief i pochvy severo-Zapadnoi chasti Lensko-Aldanskogo plato i Verkhoianskogo khrebta po dannym ekspeditsii. 1925. /Geology, Relief, and Ground of the Northwestern Part of the Lena-Aldan Plateau and of the Verkhoyansk Mountain Range according to the Information of the 1925 Expedition/. Material of the Commission for the Study of Yakutia, No. 4, 1926.

137. Obruchev, S.V. Kolymsko-Indigirskiy Kray /The Kolyma-Indigirka Region/. Trudy SOPS, Yakutia Series 1, 1931.

eastern side of the Indigirka, the Yukagir Plateau east of the Kolyma (Yukagirskoye Ploskogorye, 300-400 meters high with local elevations of 1,000-1,200 meters). Within these regions older (Vollosovich) and also newer explorations, such as those of S. V. Obruchev (74) and Vakar (224) have found no traces of glaciation. Vollosovich only found sand in the river valley of the Omolon, a right tributary of the Kolyma, which he indicated as fluvioglacial, and shifting rocks, which could, however, have also been transported here by river ice. This slight finding certainly admits of the possibility.

According to knowledge to date, the area between the lower Kolyma and the Chukchi Peninsula is regarded as having been fully glaciated. The indicated of this lies in numerous reports: but the character of the glaciation is not clear. S. V. Obruchev (136) is of the opinion that the ice covering was not everywhere closed. The main carriers of the glaciation were the northern Anyuy Mountain Range, in the main section the Anadyr' Range in the west and the ridges of the Chukchi Peninsula in the east. The borders of the entire glaciated area have still not been determined in detail. But there are numerous reports that the glacier in places extended to the coast, thus, for example, on the Chaun Bay in the north, on Cape Chaplin, and in the Provideniya in the east. Toward the south in the direction

74. Gregoriev, A. A. Geologiia, relief i pochvy severo-Zapadnoi chasti Lensko-Aldanskogo plato i Verkhoianskogo khrebta po dannym ekspeditsii 1925 g. /Geology, Relief, and Ground of the Northwestern Part of the Lena-Aldan Plateau and of the Verkhoyansk Mountain Range according to the Information of the 1925 Expedition/. Material of the Commission for the Study of Yakutia, No. 4, 1926.

224. Vakar, V. A. Geologicheskie issledovaniia v basseine reki Berezovki /Geological Research in the Berezovka Basin/ Isvestiia of the Geographical Society No. 65, 1931.

136. Obruchev, S. V. Drevnie oledenenie i chetvertichnaia istoriia Chukotskogo okruga /Old Glaciations and Quarternary History of the Chukchi Okrug/. Isvestiia of the Academy of Science, 1939.

of the Anadyr' depression the glacier crossed the foot of the mountains only in slight measure. From the northern Anyuy Range the glaciation zone continues toward the south to the Gydan /also: Kolyma/ Range, but information on the borders of the glacier in this direction is lacking. As Saks (170) reports, more recent research has been made in the area of this glacial region and also on the Chukchi Peninsula, but this research has not yet been published.

The glaciation of the Koryak Peninsula was almost as extensive and as closed off as that in the north. The starting point for the ice masses was the 1,300-2,200 meter high Koryak Mountain Range, and from here the ice masses flowed in a broad front to the sea. In the process they not only covered over the slope gently inclined toward the southeast, but in parts they even reached the coastline. In contrast to the ice flow in this direction, the ice flow toward the northwest to the lowlands of the Anadyr' and the Penzhina was slight.

Apart from the northern and southern edges, the Anadyr' Lowland is itself free of all traces of a glaciation, as Polevoi (155), Soszawa (195), and S. V. Obruchev (136) have determined. Glacial traces are also very rare in the western hinterland between the upper course of the Anadyr' and the Penzhina. Here they appear only in places in the mountain ridges and then only from a height of 1,000 meters. Also the transition area from the Anadyr' Lowland to Penzhina

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170. Saks, V.N. "O chetvertichnom oledenienii severa Sibiri /On the Quarternary Glaciation of Northern Siberia/," Arktika, Vol. IV, 1936.

155. Polevoi, P.I. Anadyrskii krai /Anadyr' Kray/. Trudy of the Geological Commission, 1915.

195. Soszawa, V. "Das Anadyrgebiet," Zeitschrift der Gesellschaft für Erdkunde /Journal of the Geological Society/, Berlin, 1930.

136. Obruchev, S.V. Drevnie oledenenilie i chetvertichnaia istoriia Chukotskogo okruga /Old Glaciations and Quarternary History of the Chukchi Okrug/. Isvestiia of the Academy of Science, 1939.

133 Bay has experienced no glaciation. However the mountain ranges north of Penzhina Bay (Kamennyy and Ichigemskiy Ranges) have housed glaciers, as is indicated by the glacial deposits on the Oklan, a right tributary of the /47/ Penzhina. Individual glaciers have even pushed as far as the Penzhina itself and have borne ahead shifting rocks as far as the neighborhood of the mouth of the Penzhina.

The Anadyr' Lowland was separated from the basin of the Kolyma in the Ice Age, undoubtedly by heavy mountain glaciations, just as the basin of the Kolyma was isolated from the Yana and the Indigirka. In this connection the Anadyr' Lowland played a special role as a place of refuge for the Arctic plant world. Here the plant world could preserve itself in order to re-occupy the land as it became free after the disappearance of the ice. Tolmachev (217, 218) and the Swede Hultén

217. Tolmachev, A. I. O proiskhozhdenii tundrogo landshafta /On the Origin of the Tundra Landscape/. Priroda, 1927.

218. Tolmachev, A. I. Flora tsentral'noi chasti Vostochnogo Taimyra /Flora of the Central Parts of the Eastern Part of the Taimyr Peninsula/. Trudy of the Polar Commission, No. 8, 1932.

(81) have devoted detailed investigations to these questions. Hultén

81. Hultén, E. Outline of the History of the Arctic and Boreal Biota during the Quarternary Period. Stockholm, 1937.

has determined that similar conditions to those in the Anadyr' Lowland must have prevailed on the side of Alaska lying opposite this area. On the basis of the similarity of the plants and the type of their diffusion around and on both sides of the Bering Sea, he comes to the conclusion that a land connection between the two continents must have existed during the Ice Age. Now Antevs and Daly (48) have reckoned the

48. Daly, R. A. "Pleistocene Changes of Level," American Journal of Science, Series 5, Vol. 10, 1925.

the eustatic depression of the surface of the water for the maximum glaciation at 90-100 meters. According to the present depth relationships in the area of the Bering Strait, a lowering of the sea level by

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50 meters would have caused the formation of a land bridge 300 kilometers wide, and a lowering by 100 meters would have caused the formation of one 1,200 kilometers wide. Hultén asserts on the basis of his plant-geographic investigations that a land bridge at least 1,200 kilometers wide must have existed.

With the existence of such a wide land bridge the climatic conditions in "Beringia," as Hultén names this combined land connection, must have been essentially different from what they are today. The southern coast of Beringia was washed by the warm water of the Pacific. The moderating influence of this pressed toward the north and made itself felt at least in the lower regions in the south of the Chukchi and Alaska Peninsulas. Only thus can an explanation be found for the fact that in the lowlands of the Anadyr' and Penzhina, surrounded by glaciated mountains, relics of a Tertiary flora have remained even up to the present, and there are even wood types, such as the Chosenia macropolis and Betula cajandri.

Since in the formation and preservation of the land connection between the two continents isostatic forces could have had their effects then and long afterward, the possibility cannot be rejected that the land bridge could also have existed for a certain time in the Post-glacial period. The marine Quarternary at the Bering Strait is indicated as a deposit of an inner basin. In the Anadyr' basin the marine transgression was a very late one; it consists exclusively of recent forms of superior preservation and is obviously very young. These determinations point to a late appearance of the sea. /48/ With the recognition of a continued existence of the land bridge in a Post-glacial time an acceptable solution would be found for the question of the immigration of people from Asia to America, even though exact proof must be left for the future.

On Kamchatka the high volcano basin-shaped gorges (Klyuchevskaya Sopka 4,775 meters, Sopka Tolbachin 3,682 meters, Koryatskaya Sopka 3,457 meters, and others) are even today covered by glaciers, which extend down to a height of 1,200 meters. Numerous indications of an old glaciation are known especially on the southeastern coast. In Avacha Bay near the city of Petropavlovsk a developed trough valley formed by a more than 50 kilometer long glacier has been determined, which almost reaches the sea coast. At the foot of the Kamen' Volcano lie moraines at a height of 200-250 meters above sea level (103).

103. Konradi, S. A. and Kel', N. G. Geologicheskii otdel

Kamchatskoy ekspeditsii 1908-1911 /Geological Division of the 1908-1911 Kamchatka Expedition/. Isvestiia of the Geographical Society, 1925.

In the view of various researchers this is a foreland glaciation, which in places pressed forward as far as the coast (101). In contrast to this,

101. Komarov, V.L. Putishestvile po Kamchatke /Travels in Kamchatka/. Reports of the Kamchatka Expedition, St. Petersburg, 1912.

the glaciation on the west coast was not so extensive or so thick. The glacier pressed only a little beyond the foot of the mountains into the flat coastal plain. While on the east side, as has already been mentioned, the glacier almost reached the coastline, on the west coast it came only to a point 70-80 kilometers from the coastline at the same latitude as Petropavlovsk. (101) Further to the north, in the river area of the

101. Komarov, V.L. Putishestvile po Kamchatka /Travels in Kamchatka/. Reports of the Kamchatka Expedition, St. Petersburg, 1912.

Belaya, old moraines lie at a height of 630-687 meters above sea level, all of this being a sign that the glaciation in the west was slighter than that in the east. The glaciation of Kamchatka proceeded both from the eastern and from the western mountains. In the south, where the two mountain chains meet, the ice masses, too, joined together. On the other hand, the Kamchatka Valley itself was not glaciated, even though it was surrounded on three sides by glaciated mountains. In the interior of the long valley, which is only up to 80 kilometers wide, there are only river and lake deposits, and not until the rims do fluvioglacial formations and then also moraines appear (113). Thus the

113. Kushev, S.L. Geomorfologicheskii ocherk severnoi chasti tsentral'noi Kamchatki depressii i doliny srednogo techeniya reki Kamchatki /Geomorphological Sketch of the Northern Part of the Kamchatka Depression of the Valleys on the Middle Course of the Kamchatka River/. Doklady of the Academy of Science, Moscow, 1938.

glaciation of Kamchatka mirrors approximately the present rainfall. During the Ice Age the snow border lay at approximately 700 meters; today it lies at a height of 1,500-1,800 meters.

The area round Lake Baykal should be mentioned as the final area of extensive glaciation. In the first place this is a mountainous area northeast of Lake Baykal, and this mountainous area begins at the northeastern end of Lake Baykal and stretches beyond the Vitim to the Olekma (North Baykal mountain country, Patom Plateau). According to the writings of numerous researchers (Krapotkin, V. Obruchev, A. Gerasimov and others), the fact of an extensive glaciation of this area is beyond doubt, but opinions differ on the type of glaciation, and this is being clarified only gradually. V. Obruchev first asserted that it was an inland glaciation, and from here he came to the view that there was a great glaciation of all of north Siberia, but this was later proved erroneous. As proof of the inland ice character northeast of /49//Map of Glaciation in Transbaykal (according to Eskola (58)/.

58. Eskola, P. "Beobachtungen über die Glazialbildungen in der Gegend der Wasserscheide zwischen dem Barguzin und der ob. Angara in Transbaikalien," Comtes rendu de la Societé Geologique de Finlande. /Proceedings of the Geological Society of Finland/ No. 1, 1929.

The sketch shows the extent of the glacier in the watershed region between the Barguzin and the Namama, which flows via the Svetlaya into the Upper Angara. The white areas represent the glacier with its various directions of flow. The directions of flow follows the river valleys, while the high plains lying in between remained free from all glaciation. The type of glaciation depicted in the sketch can be considered as typical of Transbaykal. /50/ Lake Baykal, Obruchev points principally to the following marks: rounded mountain slopes, round knolls, gorges, gorge lakes, trough valleys, worked out terraces, Oser, etc., and also erratic blocks, which appear on the watersheds. Meister (123) /sic/ later pointed out that the "erratic blocks" on the watershed

123. Lopatin, I. A. Gol'dy /The Goldi/. Zapiski of the Society for Exploring the Amur Area. Vladivostok, 1922. /The author probably meant to refer to footnote 128: Meister, A.K. Vostochnaia okraiña Lenskogo zolotonosnogo raiona /The Eastern Border Area of the Lena Gold Fields/. Geological

Map of Glaciation in Transbaykal (according to Eskola (58).

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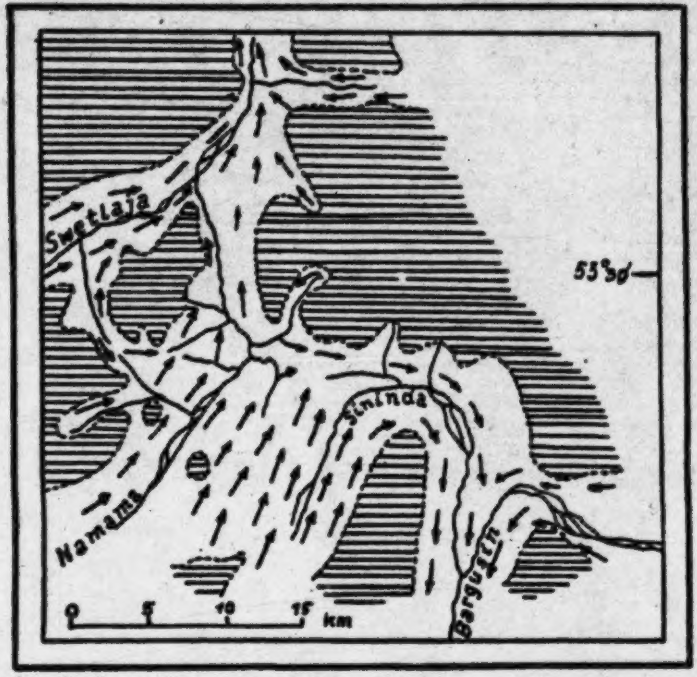


The sketch shows the extent of the glacier in the watershed region between the Barguzin and the Namama, which flows via the Svetlaya into the Upper Angara. The white areas represent the glacier with its various directions of flow. The directions of flow follows the river valleys, while the high plains lying in between remained free from all glaciation. The type of glaciation depicted in the sketch can be considered as typical of Transbaykal.

are of local origin and consist of the same rock as that lying underneath, which otherwise is covered over with deposits. The rounded off slopes in these regions of permafrost could also have been formed by ground flows. Meister declared verbatim: "On the Vaga I saw loamy masses of great thickness which in their movement tore along with them century old trees as though a hurricane had passed through there; also embedded pieces of neighboring rocks from the earth were carried along--in a word: it was a recent loam glacier." (128) On the basis of this and other determinations, V. Obruchev changed his opinion and accepted the reduction of the glaciation from an inland ice covering in the north (Vitim-Olekma mountain country) to an Alpine type in the south. However, the results of further research have caused it to be recognized that we are dealing here generally with one glaciation of the Alpine type. Eskola (58) has conducted investigations east of Lake Baykal between the Vitim, Upper Angara and the Barguzin, and these investigations have clearly indicated the Alpine character for this region. The valleys of most of the rivers (Barguzin, Svetlaya, Sininda, Namama, Oktokitan, etc.) were filled with ice masses of great valley glaciers, which had a thickness of 400-500 meters. The higher elevations projected above the ice level of the valleys, but had themselves small glaciers, which descended to the valley glaciers. The Barguzin Mountain Range, whose surprising similarity to the Alps is brought out by all researchers, can be regarded as the best example for this region.

Research in the Gold Fields of Siberia, No. 10, 1914./

128. Meister, A.K. Vostochnaia okraina Lenskogo zoloton osnogo raiona /The Eastern Border Area of the Lena Gold Fields/. Geological Research in the Gold Fields of Siberia, No. 10, 1914./, pp. 22-23.

58. Eskola, P. "Beobachtungen über die Glazialbildungen in der Gegend der Wasserscheide zwischen dem Barguzin und der oberen Angara in Transbaikalien" /Observations on the formation of glaciers in the area of the watershed between the Barguzin and the upper Angara in Transbaykal/ Comtes rendu de la Societe´ Geologique de Finlande. / Proceedings of the Geological Society of Finland/, No. 1, 1929.

Remarkably enough the valley of the Upper Angara, which stretches far to the east between glaciated mountain ranges (Upper Angara Range in the north, the Barguzin Range in the south) was not exposed to glaciation. 133

Also south of Lake Baykal the mountain ranges had glaciers, which in the valley of the Slyudyanka and Pokhabikha reached the level of Lake Baykal in the form of valley glaciers. Here more than 25 glaciers have been counted in an area of 60 square kilometers, but these were all only insignificant ones which at most had a length of 10 kilometers. The landscape is rich in gorges, which lie at very different heights ranging from 50 meters to 600 meters above the present level of Lake Baykal (454 meters above sea level). Thus the Ice Age snow boundary must have been very low here in comparison with the neighboring Sayan (around 2,000 meters) and the northeastern Baykal area (at least 1,200 meters). An explanation for this striking appearance can be seen in the fact that Lake Baykal itself even in the Ice Age /51/ exerted an influence on the climate of the surrounding areas, an influence which was especially noticeable here in the southern part where even today the rainfall is high. The slope of the Khamar-Daban turned toward Lake Baykal is the rainiest area in Transbaykal. But in addition there is the fact that southern Lake Baykal is an area of recent depression, which continues even today, and accordingly the traces of the glaciers can also be regarded as subsequently dislocated.

There are also local glaciations in Transbaykal apart from the above-described glaciated areas. The best known are the glaciations of the 2,500 meter high Sokhondo and neighboring mountains, where gorges, trough valleys, and even moraines appear on the slopes.

Traces of an old glaciation have also been found in the Dzhugdzhur, in the Stanovoy, which extends up to 2,482 meters in height, in the Tukuringra Range in the heights on both sides of the Zeya break-through, and in the Yam-Alin (2,215 meters). However, the signs are but slight throughout and appear only in a limited area, and accordingly here there were at most individual dotted glacier formations.

The Permafrost and Its Significance

The largest part of the Soviet Russian Far Eastern region lies in the sphere of the permafrost or the Eternally Frozen Earth, as this 133 134

132 appearance of nature is also named, and this therefore deserves special
134 treatment within this work. The Soviet government has specially under-
[69] taken research on this phenomenon,[1] which is typical of the largest
part of Siberia and also for parts of the European north; the government has erected eight permanent research stations for this purpose, of which four are in the regions being discussed: namely, in Petrovsk (Transbaykal), Skovorodino on the railroad line north of the northern arc of the Amur, Bomnak in the trough depression of the upper Zeya, and in Anadyr'. In addition to B. Shostakovich, M. Sumgin especially has done great service in research on permafrost. Orientation on the extent of the permafrost is given in the attached sketch map, which is based on Russian sources. This map shows that the only areas completely free from frozen ground are the areas on both sides of and between the Zeya and Bureya rivers and perhaps the area east of the Bureya Mountain Range, including the entire Ussuri country and the Maritime Krai. Frozen earth is not found in the larger southern part of Kamchatka and on Sakhalin Island either.

In the areas which are dominated by permafrost, the ground thaws in the summertime only superficially in a layer whose thickness varies considerably with the locale, and under this layer lies the permafrost, i.e. a constantly frozen layer of earth, which likewise is of varying thickness. The upper layer which thaws in the summer, is called "active" (deiatel'nyi sloi) /52/ by the Russians, and only it is the bearer of organic life. In the majority of cases the pieces of earth in the permafrost area are so strongly cemented together by ice that the ground gives way only under the blows of a crowbar. However, this sign of linking together by ice must not be used as the sole means of determining whether the ground should be classed as eternally frozen; rather this classification depends above all on the temperature. Thick rock can also bear permafrost, although no external changes can be discovered on the rock.

In the winter the ground freezes from the surface down. In many cases, then, the winter freeze and the permafrost grow together into one unit, but in most cases there remains between the two an unfrozen horizon, whose water under special morphological conditions, especially at the foot of slopes, breaks through the upper frozen layer or is pressed out by the pressure from above of the frozen earth. This leads to formations of ice on top of the ice (Naled'), which, since the water flowing out freezes again and again, can often extend over a large area and can attain a thickness of more than one, indeed of two meters.

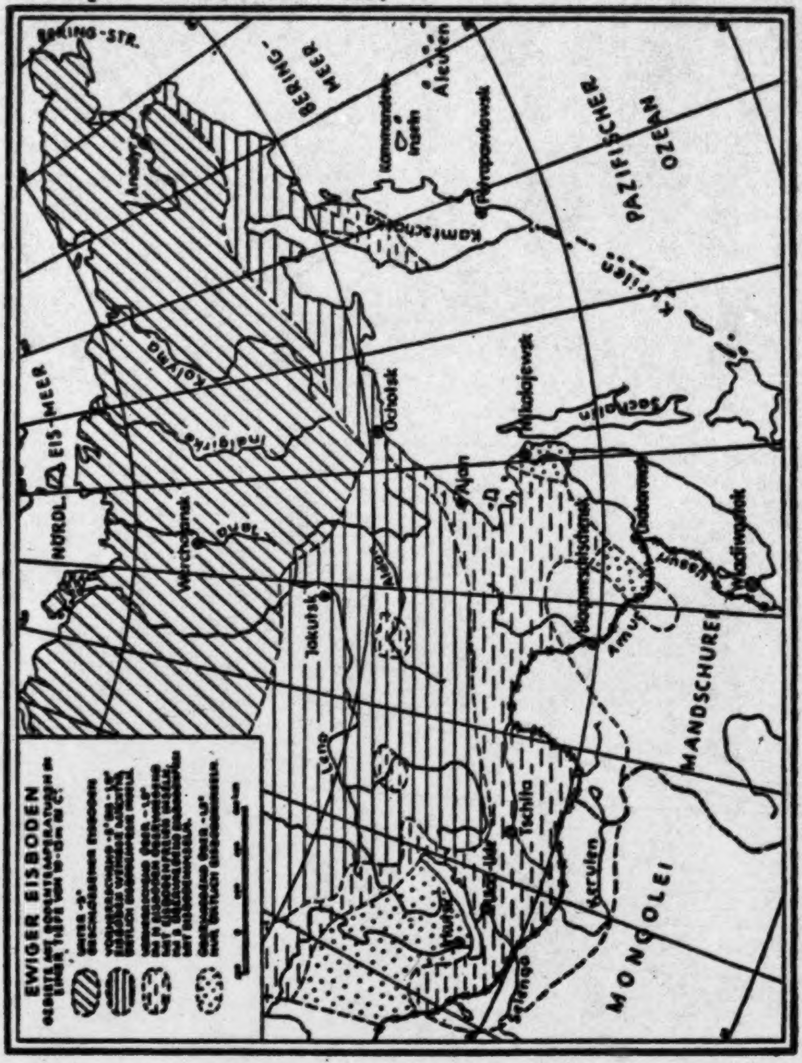
[1] [i.e. permafrost -- Analyst]

132 134 Or, under specific conditions, ice kernels form within the earth. These ice kernels grow and press the upper layers of the earth into a hill, which then in the warm season collapses again. As a result a lake is frequently formed in place of the hill because of break-throughs in the earth. Generally the existence of frozen earth permits the absorption of the surface water only to a certain depth, and accordingly the rainfall for the most part must flow off on the surface. The irregular water flow of the rivers in these regions often goes back to this phenomenon. Thus the contrast between the high and low water lines is very great everywhere. At the confluence of the Shilka and the Agrun, the Amur passes, as its annual mean 1,200 cubic meters of water per second, while the minimum during the year is only 125 cubic meters per second. Heavier rainfall makes itself felt immediately in an often flood-like rise in the water being passed in the rivers. The thawing of the surface layers of the earth, especially in areas with varying morphological formations, offers the best conditions for ground flows. Thus the domain of the permafrost is the classical land for landslides and solifuction.

132 134 499 But, in addition to these numerous and very interesting natural phenomena, the effects of the permafrost on man and his economy must be mentioned; these effects are apparent everywhere in the permafrost domain and often bring difficulties. Through freezing the volume of the water expands, presses the ground upward in places, and causes destruction of transportation installations. Deep tears occur in the railroad line, and through these tears mud and water from deeper layers often push out, /53/ /Mapof the permafrost area:/ /54/ freezes on the surface, bursts the splits open farther, and forms high bucklings, and thus gradually the roads become unusable. With the setting in of the thawing weather, everything sinks together in mud and pulp.

[491] In addition the roads and especially the bridges are by preference the starting points for ice building on ice. As an example Sumgin points out the road built from Bol'shoy Never on the Amur railroad, via Tyndinskiy and the Aldan gold region, to Yakutsk on the Lena. This road should be usable for trucks the entire year. Out of the entire length of 1,300 kilometer, on the southern part alone between Bol'shoy Never and Tommot, which is 728 kilometers long, 117 formations of ice on top of ice were counted in the winter of 1927-28. These formations caused serious destruction, especially on bridges which were as a result partially raised up, made crooked, and gradually

Map of the Permafrost Area: /53/


BERING-STR.
BERING-MEER
Aleuten
Kommandeur Inseln
Petropawlowsk
PAZIFISCHER OZEAN
Kamtschatka
Kurilen
Anadyr
Kolyma
Ochotsk
Nikolajewsk
Sachalin
Indigirka
NÖRDL. EIS-MEER
Werchojansk
Jana
Ajan
Aldan
Jakutsk
Blagowestschensk
Chabarowsk
Ussuri
Wladiwostok
Amur
MANDSCHUREI
Lena
Tschita
Ulan-Ude
Kerulen
Selenga
MONGOLEI
EWIGER EISBODEN

Areas with Ground Temperatures in Celcius Degrees at a Depth of 10-15 Meters:

▨ Under - 5°
Closed-off area of frozen ground.

▤ Predominantly - 5° to - 1.5°
Frozen earth less thick
Islands here and there where the ground is not frozen.

(Captions continued on following page)

/53/

132
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▤ Predominantly over - 1.5°
In the north predominantly frozen earth
with islands where the ground is not frozen.
In the south for the most part the ground
is not frozen but there are islands where it is.

▦ Predominantly over - 1.5°
Only in places are there islands where the ground
is frozen

132 134 499 made unusable. In the spring after the melting away of the ice, the bridges completely collapse. The population claims that earlier formations of ice on ice occurred only seldom in these same regions. Thus it must be assumed, and Sumgin also points this out, that the formations of ice on ice are encouraged by the building of roads. Through trials and experience, various new methods of road-building have been found which hinder this damage, but it can not be entirely eliminated. In general terms it can be said that in the areas of permafrost road-building is very difficult, requires a longer time, and is done at much greater cost than in other regions.

Of a similar type are the difficulties encountered in building and maintaining railroad lines. In addition to the pulsation of the earth, landslides and solifluction are regarded as being especially dangerous here. In building the Amur railroad line all these hindrances and difficulties became known in detail. Often, without regard to the cost, the lines had to be laid entirely differently from what had originally been planned. Especial difficulty was encountered in providing water for the railroad in the winter in the areas of permafrost. Water had to be drilled from layers which lay under the permafrost. In many places water had to be procured in kilometer-long, heated conduits. A comparison of costs shows best how great the difficulties were in building the Amur railroad line in the areas of permafrost and to what extent these difficulties increased the costs here versus those in other regions. The building of the great Siberian Railroad (as far as Sretensk in Transbaykal), including all preparatory work, required as a mean an expenditure of 67, 737 rubles per verst, while the western part of the Amur line from Kuenga to Kerak, whose total lenght is 597 verst, required for pure building costs an average expenditure of 158, 000 rubles per verst. Also the maintenance of the railroads requires larger outlays, since the railroad lines, and especially the bridges, require constant and very careful inspection, in order to be able to take /55/ protective measures in time at the slightest sign of any destruction whatsoever. Thus in the course of the year position changes were determined on 50 out of a total of 80 bridges on the Amur railroad, and these position changes had to be eliminated by protection and rebuilding measures.

132 134 342 The permafrost also plays a noteworthy role in the method of construction. Apart from the direct effects of the cold, the buildings in the sphere of the permafrost are subjected to the danger of gradual decay. The reason for this lies principally in the fact that the ground

under a building freezes little if at all during the winter. V.G. 132
Petrov (154) writes on this subject: "The house stands as though on 134
the edge of a frozen crust. If now this crust begins to thaw, its edge spreads the house lengthwise and widthwise, and the damage begins." This leads to general deformation of the house and to the gradually sinking in of the house into the ground. Sumgin points out that this danger is caused above all by so-called "swimming" masses, which form under the house and which can be traced back to the changes in the thermic conditions in the ground. With larger structures of several stories, they can often be caused by the pressure of the structure alone. In individual cases it happens that the water in the earth, which lies between the winter freeze and the permafrost and which is under a certain pressure, finds a way into the open underneath the house. It penetrates into the cellar and even into the living quarters and forces the occupants to leave the house. Not uncommonly the penetration of the water occurs so quickly that the occupants do not succeed in rescuing all their possessions from the rooms. The regions of permafrost require construction methods which counteract these dangers. As a rule an attempt is made to lay the foundation so deeply that it has a firm position in the permafrost; to do this, mostly wood or reinforced concrete palings are inserted into prepared holes deep in the permafrost. In the construction of new cities and plants the question of a sufficient and secure foundation plays an important role, and it also is an important factor in the cost estimate. In building the city of Magadan, where apartment buildings with up to six stories were erected, thick layers of earth had to be removed in order to install the foundations so that the foundations became frozen fast into the ground. The sides of the foundations were protected by insulating layers. Often the foundations were entirely embedded in insulating layers here. In order to eliminate all these difficulties, M.M. Kryllov, whom Sumgin cites, had drawn up a plan to be carried out with the help of modern cold technology; this plan envisaged keeping the ground within the construction installations always under a certain temperature with the goal either of preserving the permafrost at a certain depth or even of raising it. However, this proposal has been tried out but little in practice.

154. Petrov, V.G. Naledi na Amursko-Iakutskoi magistrali /Formations Breaking Through the Ice (Aufeisbildungen) in the Amur-Yakutsk Magistracy/. Academy of Science, Moscow, 1930. 342

000 even of raising it. However, this proposal has been tried out but little in practice.

132 134 312 /56/ In addition to the general water supply, the supplying of drinking water in the permafrost regions in winter causes many difficulties, especially for larger settlements. Since many rivers freeze to the ground, the water must often be gotten from far away. In many places artificially caused formations of ice on top of ice are used to help in smaller settlements. But it would lead us too far astray to go into detail here on the various and often also unique methods of procuring water.

132 134 316 The permafrost is also of great importance in connection with mining and with the extractions of natural resources generally. In pit mining the permafrost sets great hardness against the invasion of man. Even diamond drills fail sometimes, and, if the motor stops for even a moment, the drill freezes fast in the water of the hole being drilled. The pits and galleries are mostly firm and hold even without supporting beams, the danger of chokedamp is slight, and also ground water seldom appears, and only occasionally do water break-ins occur. In open mining the permafrost must be dynamited, but then the blocks knocked loose turn into bulky pulp. Gold extraction has to overcome special difficulties in the working of gold wash-works which mostly are in the permafrost and lie under a thick, unfrozen layer of earth which can be removed rather easily. In the most important gold regions the most modern machinery is employed to process the gold-bearing sand in one vein with everything from dredge to dressing-floor, but all these technically complete establishments conduct a difficult battle with the permafrost, whose hardness gives extraordinary resistance. The natural thawing under the air temperature of the summer proceeds so slowly that man must help it along. The primitive thawing with the aid of wood and coal fires has disappeared, and jets of water also do not suffice here. At present, steam is employed everywhere, and new announcements report that the use of electricity is being considered for the future.

132 134 The role played by permafrost in connection with vegetation is many sided, but the mutual relationships are still too little clarified. For the agrarian economy the permafrost is a more favorable factor as a source of ground dampness, especially in the interior which suffers from a shortage of summer rainfall. Here the dampness of the ground is a natural compensation. It is due to the exploitation of these favorable conditions that Soviet Russia has succeeded in spreading agriculture,

if not in large areas, yet sporadically toward the Polar Circle, where 132 cultivated areas are to be found to a greater or lesser extent near all 134 settlements as far as north of Magadan. These cultivated areas serve as a source of local supply.

/57/ The Climatic Conditions

The climatic conditions are determined by the seasonally 132 changing contrast of the barischen /baric?/ relationship between continent and ocean. In winter dry air masses flow toward the ocean; the summer sea wind on the other hand brings dampness into the land. Accordingly the influence of the ocean is limited to the true Far Eastern regions whose waters empty into the Pacific. These regions accordingly form a climatic unit. As a consequence of the regular seasonal climate changes, these regions belong to the East Asiatic monsoon area, whose typical character is clearly stamped everywhere and has its effect as far north as beyond 60° latitude. Only Transbaykal lies outside of this unit. Its inland location allows the continental traits to appear much more sharply. But the summer monsoon also makes itself felt here as far as the Yablonovyy Mountain Range.

The following climate areas in addition to Transbaykal can be differentiated according to their general character: the Amur-Ussuri area, the southern coastal region, in which Sakhalin is also included, the northern coastal region including Kamchatka Peninsula, and the Anadyr' region. The important distinguishing features are included in the following chart:

Area	Annual Rainfall in millimeters	Number of months with a mean over		Annual Temperature Variation
		5°	10°	
Transbaykal	200 - 340	5	3	42° - 52°
Amur-Ussuri Region	525 - 620	5	5	42° - 48°
Southern Coast	540 - 760	6	4	30° - 34°
Sakhalin	500 - 750	5	4	28° - 35°
Northern Coast	300 - 900	4	2	33° - 37°
Kamchatka	500 -1,000	4	2	23° - 32°
Anadyr'	190 - 200	3	3	40° - 45°

Transbaykal has very slight rainfall and great temperature

/52 variations during the year. The Amur-Ussuri region has almost double the rainfall and equally great temperature variations. The entire coastal area in general has still greater rainfall and a much smaller temperature range. The Anadyr' region again shows slight rainfall and high annual temperature variations.

The Amur-Ussuri region exceeds all other regions in the number of months with a mean temperature over 10°. In the coastal area the number of warm months decreases toward the north. The Anadyr' region again exceeds the northern coastal area and Kamchatka in the number of months with a temperature above 10°.

Transbaykal is a transition area in terms of its climate. It shows the signs both of the Siberian forest climate and also of that of the Mongolian steppes. In addition, a local factor in the climate /58/ with noteworthy influence is Lake Baykal. Only rarely does the annual rainfall exceed 300 millimeters. In this the driest areas do not only lie near the Mongolian border, where Novo-Selenginsk has an annual rainfall of only 162 millimeters, but remarkably enough the dry areas extend even to Lake Baykal. The Buryat who are settled on Ol'khon Island (169 millimeters) and in the Barguzin Valley are forced to use artificial irrigation. An exception in the general poverty of rain is the northern slope of the Khamar-Daban, which receives 515 millimeters annually at Mysovaya. Likewise the thicker snow covering and the heavier forestation of the northern slopes indicate that Transbaykal is preferentially supplied with dampness from the northwest. An important characteristic, hereMongolian, is the great contrast in the rainfall at different times of the year. In the summer half of the year 75 percent and more of the annual total falls, while the winter months (December, January, February) are considered very sparse in rainfall with 3-10 percent of the total. Winter brings very severe cold. At −31.4° Nerchinsk has the lowest mean temperature for January. As a result of the slight, often completely non-existent snow covering, the frost penetrates very deeply into the ground. Accordingly the land lies in the sphere of the permafrost, which with a depth of 57 meters at Mogzon station, west of Chita, reaches its deepest depth determined thus far in Transbaykal. Because snow is lacking, road traffic takes place in winter too by means of wagons or on sleds on the frozen rivers. Because of the dryness the streets are just as dusty as in the summer. An advantage of the Transbaykal winter--an East Siberian characteristic--is its imposing quietness, its pure air, and its constantly blue,

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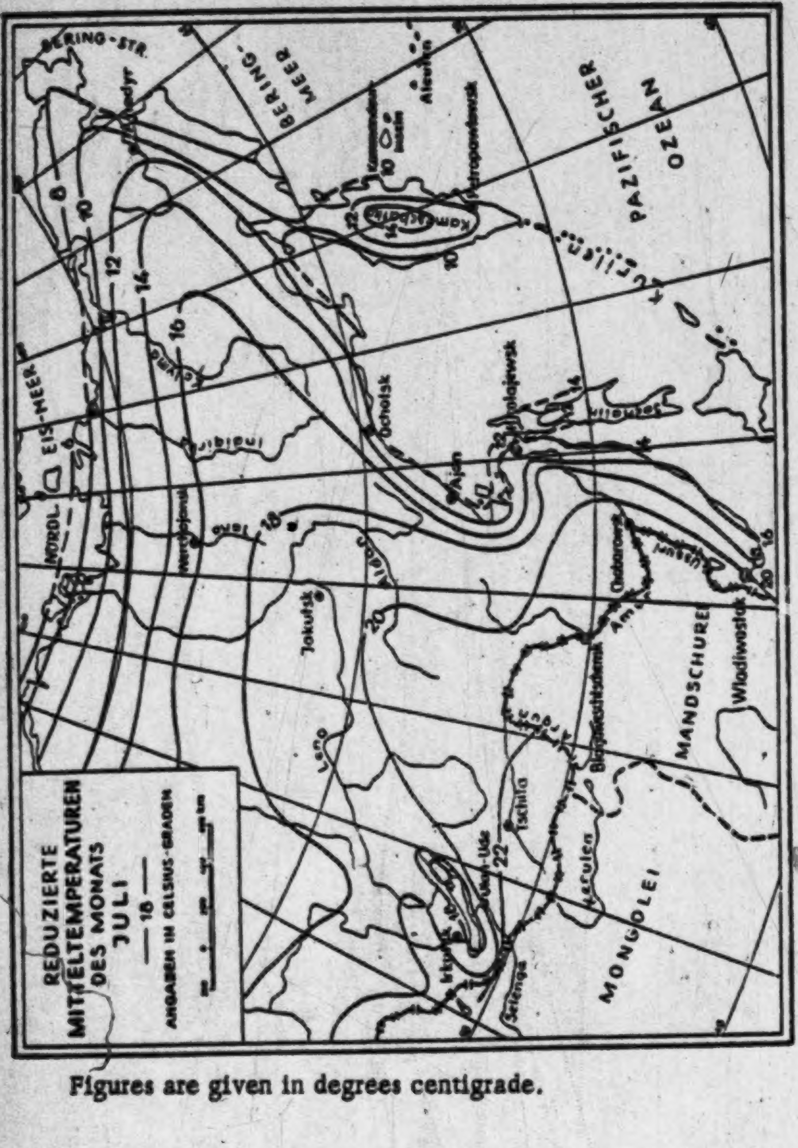
bright sunny skies. The air is so dry that the snow often evaporates directly without going through the liquid stage. On small brooks, which in many cases freeze to the ground, the ice often disappears leaving only the river bed. Spring is short. Since the time for the melting of the snow is almost completely lacking, the ground gets warm very quickly. For the same reason there is no high water in spring. The amount of water in the rivers depends on the rainfall and is largest during the summer. Summer brings very high temperatures. The unreduced July mean reaches 18-20°. Gruelling heat weighs upon the entire land, especially in the valley plains, and it is an economically important advantage of the Transbaykal climate that the summer months bring at the same time the most rainfall and the heaviest clouds of the entire year. In the course of the year, however, bright sunny days predominate by far. Transbaykal has a mean of 100-140 completely clear days a year; in this respect it approaches the desert type of climate.

A phenomenon characteristic for the climate of Transbaykal, a phenomenon to which A. A. Borisov (39) in particular has called attention, is the temperature inversion. /59//Map Showing the Reduced Mean Temperatures for the Month of July:/ /60/ If during the winter the Asiatic anti-cyclone forms over the continent with Transbaykal lying in part in the center of it, then the cold and heavy air masses collect in the valley basins, where they remain with extraordinary persistence. This explains the fact that the lower lying places as a rule have lower winter temperatures than the higher lying ones. Pereval'naya at 1,024 meters, for example, has a January temperature of -23.3°, while Chita at a height of 683 meters has a January mean of -27.4°, and Nerchinsk at 484 meters even has a January mean of -31.4°.

The influence of Lake Baykal is limited to its immediate environs, but this produces remarkable contrasts. In Listvenichnoye, at the point where the Angara flows from the lake, December and January are 10° warmer than in Ulan-Ude which is 90 kilometers from the banks of the lake, and June and July are 7° cooler. The annual range in temperature is 29.6° in Listvenichnoye versus 45.9° in

39. Borisov, A. A. Klimaty SSSR /The Climate of the USSR/. Moscow, 1948.

Map Showing the Reduced Mean Temperatures For the Month of July: /32


REDUZIERTE MITTELTEMPERATUREN DES MONATS JULI
— 18 —
ANGABEN IN CELSIUS-GRADEN
NÖRDL. EIS-MEER
BERING-STR.
BERING-MEER
PAZIFISCHER OZEAN
MONGOLEI
MANDSCHUREI
Jakutsk
Lena
Aldan
Jana
Indigirka
Kolyma
Ochotsk
Ajan
Nikolajewsk
Petropawlowsk
Kamtschatka
Kommandeur-Inseln
Aleuten
Kurilen
Sachalin
Chabarowsk
Amur
Ussuri
Wladiwostok
Blagowjeschtschensk
Argun
Tschita
Ulan-Ude
Irkutsk
Selenga
Kerulen
Anadyr
Werchojansk
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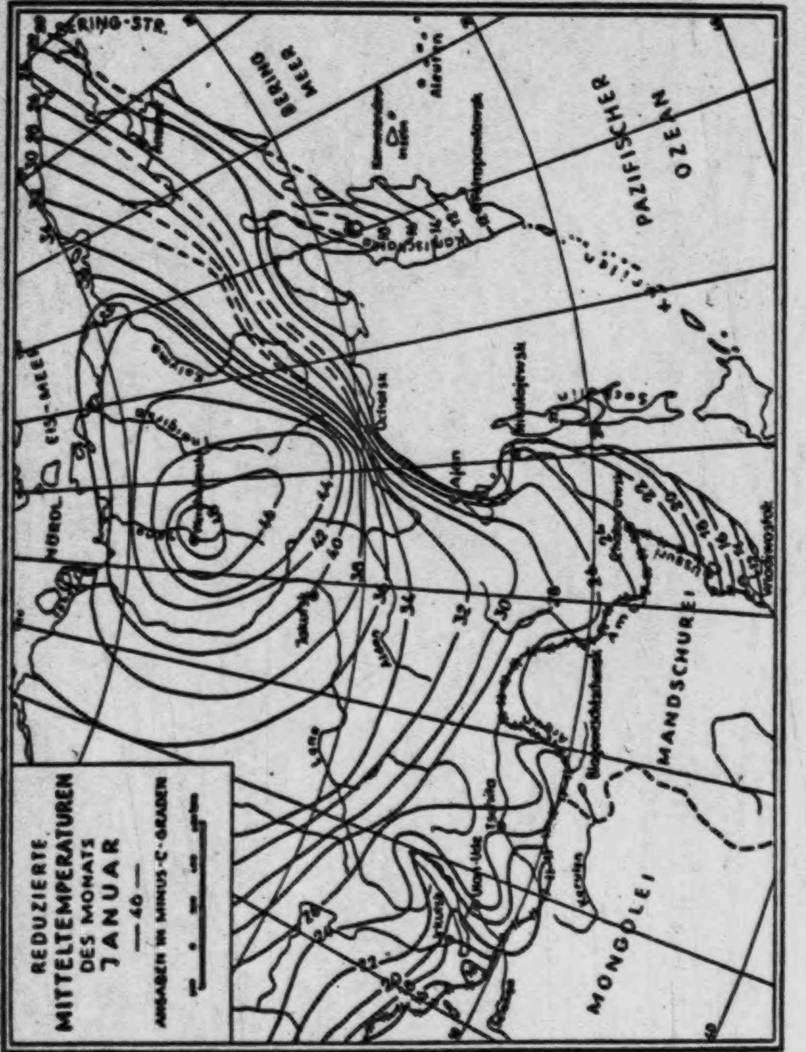
Figures are given in degrees centigrade.

/32 Ulan-Ude. As a consequence of the slow change in temperature of the water in Lake Baykal, the extreme months are postponed--all remarkable signs, which are reminiscent of an oceanic climate.

Within Transbaykal the Yablonovyy Range forms a climatic dividing line, which is expressed less in the meteorological data than in the plant covering which reflects the entire climatic conditions far better than the best instruments can record them. [57] East of the Yablonovyy Ridge deciduous trees appear in larger numbers. This shows, therefore, that the influence of the East Asiatic monsoon extends as far as here, and this is also confirmed by observation of the frequency of the change in wind directions. While in Ulan-Ude northwest and north winds rule absolutely the entire year, the frequency of these wind directions decreases significantly in the summer in Nerchinsk, where northeast and east winds appear above all.

The remaining regions of the Far East, as has already been said, stand in their climatic conditions in almost complete dependence on the seasonal change in air streams. The winter land winds bring down to the coast a high degree of coldness connected with dryness. But the summer sea winds, too, are disproportionately cool. In this connection the eastern border seas play a very disadvantageous role for the entire Far Eastern coast. The Sea of Okhotsk should be mentioned here in first place. It is a mighty cold water basin and is with justice designated the "ice cellar of east Siberia." The Kuril barrier hinders an exchange of water with the open ocean, and accordingly the water in the Sea of Okhotsk remains disproportionately cool (10°) even in summer under the continuing influence of the winter cooling-off by the surrounding land masses. In addition there is a cold ocean stream which stretches from north to south along the coast and even in summer carries great ice floes toward the south, /61//Map of the Reduced Mean Temperatures for the Month of January:/ /62/ where piled-up ice can be encountered even in July and August in the region of the Shantar Islands. In the Bering Sea and in the Sea of Japan, too, cold ocean streams move along the coast toward the south and lower the summer air temperatures not only through the water's own coolness but also through the formation of fog, which is a typical phenomenon for wide areas on the Far Eastern coast. Thus the general disadvantage of the east side of northern continents is especially marked here in the Soviet Russian Far East. Vladivostok (43° o7'N latitude) has the same July temperature as Moscow (55° 56'N latitude). Vladivostok lies at the same latitude as Nice but has a mean temperature for January of

Map of the Reduced Mean Temperatures for the Month of January:


REDUZIERTE
MITTELTEMPERATUREN
DES MONATS
JANUAR
—46—
ANGABEN IN MINUS-C-GRADEN
NÖRDL. EIS-MEER
BERING-STR.
BERING MEER
PAZIFISCHER OZEAN
MONGOLEI
MANDSCHUREI
Jakutsk
Lena
Aldan
Ochotsk
Ajan
Nikolajewsk
Chabarowsk
Amur
Ussuri
Wladiwostok
Irkutsk
Ulan-Ude
Tschita
Blagowjeschtschensk
Kolyma
Indigirka
Werchojansk
Kamtschatka
Petropawlowsk
Aleuten
Anadyr
Kurilen
Sachalin
Kerulen
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Figures are in minus degrees Centigrade

-15.1° versus Nice's of+8.0°, and in July Vladivostok's temperature is 18.9° versus 23.2° in Nice. This disadvantage of the Soviet Far Eastern coast is shown especially forcefully if it is compared with the climatic conditions on the western coast of North America:

Mean Temperatures of the Soviet Far Eastern Coast and of the North American West Coast in Degrees Centigrade

Place	Latitude	Annual Mean	Coldest Month	Warmest Month	Annual Variation
Ayan	56°03'	- 3.9°	- 20.4°	12.4°	32.8°
Sitka	57°01'	+ 5.3°	- 1.0°	12.6°	13.6°
Nikolayevsk	53°02'	- 2.3°	- 23.4°	16.8°	40.2°
Tongass	54°08'	+ 8.1°	+ 1.1°	15.1°	14.0°
Vladivostok	43°02'	+ 4.3°	- 15.1°	20.8°	35.9°
Umqua *	43°07'	+ 11.4°	+ 6.8°	15.5°	18.7°

*/sic: probably is the Umpqua River in Oregon, which lies at this latitude/

The unfriendly influence of the Sea of Okhotsk, however, is limited more to the coastline since the mountain chains running parallel to the coast prevent a further penetration into the interior of the land, and accordingly the warm summer sun has more effect. As a result of this the division into climate areas on the coast is in contrast to the other climate areas.

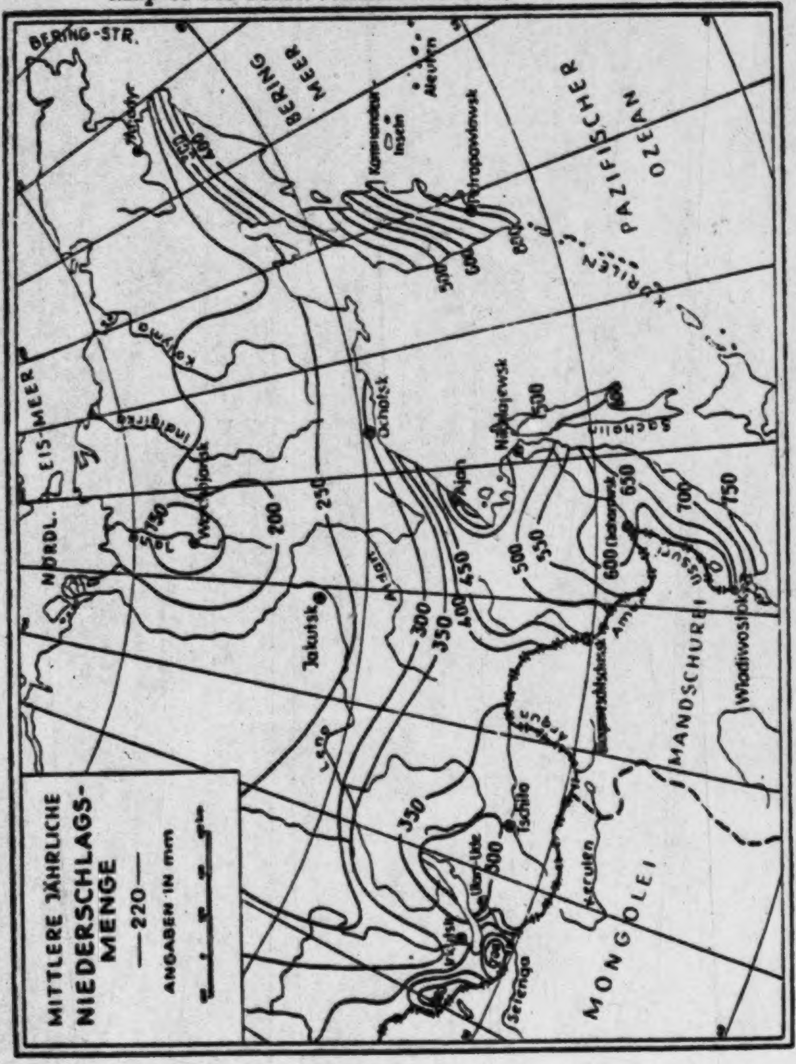
The Amur-Ussuri Climate Province lies more landwards and comprises the region of the middle and lower Amur and the valley of the Ussuri. The Sikhote-Alin' and the Bureya Mountain Ranges protect these regions in the summer from the foggy and damp-cool air masses of the sea. Instead warm and damp winds coming from the southeast and south move over the broad plains of Manchuria and beyond the Amur to the north and effect a warm and damp summer in contrast to the continental harsh and dry winter.

The favorable conditions of this climate region[1] are expressed strikingly in the vegetation, which is characterized by the appearance of deciduous trees such as oaks, elms, lindens, and other, trees which are lacking in all of Siberia and also in Transbaykal and on the coastal edge. [137]

The annual rainfall exceeds 500 millimeters in the entire area but understandably decreases from the coast toward the interior /63//Map of Mean Annual Rainfall:/ /64/ Thus Bikin

[1][i.e. the Amur-Ussuri region -- Analyst]

Map of the Mean Annual Rainfall:


MITTLERE JÄHRLICHE
NIEDERSCHLAGS-
MENGE
—220—
ANGABEN IN mm
NÖRDL. EIS-MEER
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BERING
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PAZIFISCHER
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MONGOLEI
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Inseln
Aleuten
Petropawlowsk
Jana
Indigirka
Kolyma
Werchojansk
Jakutsk
Lena
Aldan
Ochotsk
Ajan
Nikolajewsk
Sachalin
Chabarowsk
Blagoweschtschensk
Amur
Ussuri
Wladiwostok
Argun
Kerulen
Tschita
Ulan-Ude
Irkutsk
Selenga
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750
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Figures in millimeters.

in the middle Ussuri country receives 616 millimeters, Khabarovsk at the mouth of the Ussuri on the Amur receives 564 millimeters, Blagoveshchensk lying still farther to the northwest receives 525 millimeters. Of greatest importance is the fact that everywhere here the rainfall is concentrated predominantly in the summer. Almost throughout the entire country 85-95 percent of the annual total falls from April to November, and of this 50-60 percent falls in the three high summer months, June, July, and August, which therefore have much more rainfall here than by far the largest part of Transbaykal receives in the entire year. Blagoveshchensk receives 25 percent in both July and August; in short it receives half the annual total in two months. The annual course of the rainfall is shown by the following observations which represent the mean of six stations in the area. (79)

79. Hann, Handbuch der Klimatologie /Handbook of Climatology/ (Stuttgart, 1911), Vol. III, p. 292.

Rainfall in Percent of the Annual Total

Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
1	1	1	4	10	15	23	24	13	4	2	2

The same contrast as in the rainfall is shown also in the temperature during the course of the year; and in this the harshness of the winter is especially prominent. The summers, with a mean temperature of 20.2° to 21.2° for July, are warmer than in Transbaykal; the winters, with a mean temperature of -22.2° to -24.2° in January, are almost as cold. Remarkable is the great warming-up by leaps and bounds from April (means 2.4° to 3.7°) to May (mean 10.4° to 11.9°), and this is followed by a no less sharp drop in temperature from September (mean 12.1° to 13.6°) to October (mean 1.4° to 4.7°); accordingly the main vegetation period is only in months with a mean over 10°. The abnormally cold winter in the Amur country is explained by the flowing down of heavy, cold air masses from the higher continent to the coast, and these air masses follow the valley of the Amur and fill up all lowlands. Therefore, the basins of the Zeya and Bureya are distinguished by especially severe winters, and despite its southern position the Amur has the same freezing conditions as the rivers of northern Eurasia. Thus the Amur is closed by ice 197 days a year at Blagoveshchensk and 178 days a year at Nikolayevsk, 38 kilometers above its mouth. Accordingly, the Amur at Nikolayevsk (53°08' N latitude) is covered with ice as long as the Dvina at Arkhangel'sk (64°33'). As a result of the lack of snow resulting from the slight rainfall in winter, vast regions north of the Amur belong to the sphere of the permafrost.

Spring is short. Summer quickly replaces winter. Summer unites great heat with the richest rainfall of the year and fills the land with warm-damp hothouse air. The relative humidity of the air--a characteristic of themonsoon climate--is at its greatest in July with 88 percent and at its lowest in winter /65/ with 68 percent in December. September, too, is relatively dry. Cloudiness in summer is much greater than in winter. Thus the duration of sunshine in December reaches its maximum with 75 percent of the possible, and in Khabarovsk it reaches even 90-95 percent, while it has its minimum in June with 34 percent. As a result of the heavier clouding in summer the daily temperature variations in summer are slighter than in winter. (At Khabarovsk the temperature variation in February is 7.3° and in July is 4.5°). Already in the beginning of June frequent and mostly short rain storms set in, mostly in the train of cyclones which, coming from the south or southwest, reach the Amur and the area of the Lower Ussuri and then move off toward the sea in the direction of the lower course of the Amur. The ends /Ausläufer/ of typhoons can also penetrate into this region. These whirlwinds bring damp air masses far into the land, and mostly cause heavy downpours, which can lead to dangerous floods as, for example, occurred in the Zeya and Ussuri region in July 1928 when a large part of the harvest in these regions was destroyed (63). In 1872 the Amur rose and flooded the city of Blagoveshchensk, lying on the flat bank of the river, so badly that a small river steamer could travel down the main street. (132) Borisov reports that in such a case more than 100 millimeters of rain can fall

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63. Friedensburg, F. "Gold," Die Metallischen Rohstoffe /Metallic Raw Materials/, No. 3, second edition, Stuttgart, 1953.

132. Michajlov, N. /Mikhailov, N./ and Pokschischewskij, W. /Pokshishevskii, V./, Reise über die Karte der Sowjetunion, //A Trip across the Map of the Soviet Union/,(Berlin, 1947), p. 445.

132 within 24 hours. These conditions, especially the paths of the cyclones, have still not been clarified in detail. The real rain period does not begin until early in July and lasts until the end of August. During this period there is rarely a week without several days of rain.

In addition to the already mentioned downpours, rainfall also occurs in the form of land rains. A very characteristic type has been designated as "subsequent rain" /Nachfolgeregen/ by Arseniev. This occurs when after a storm the day is sunny and still; and then in the evening rain falls again because of the condensation of the rising, very high humidity.

The abundant rainfall of summer causes the rivers to swell, and their high water occasionally spills over the banks, and often interrupts all traffic. In many places the water cannot flow off right away. It remains standing on the level fields. Grass areas turn into swamps. In the low, broad plains on the left side of the Amur, above
[312] Khabarovsk, plains which were supposed to have been won for agriculture to supply the rapidly growing city, a large-scale system of drainage canals had to be created, not only in order to drain the ground but also in order to give the rainfall an easier opportunity to drain.
132 241 The great dampness along with the great heat endangers and decreases the harvest of European types of grain. The grain shoots into grass but the corn yield is slight. The sprouting of the plants suffers from the dryness, while the blooming, ripening, and harvesting fall in the rain period. In this the dampness of the ground /66/Climate Diagram: Ulan Ude; Chita/ also plays a role, for, according to many reports, the yield of the grain fields in the hilly country on the mountain ridges and slopes is higher than the yield of the fields in the valley areas. The softening of the ground by the summer rains makes the use of machinery difficult, and this appeared as a restraining factor in the establishment of the kolkhoz system and the MTS (Machine Tractor Stations). In part steps had to be taken toward the construction of new machines. On the other hand
132 137 the climate fosters the development of vermin and fungus. The corns of grain are not uncommonly attacked by a spore fungus (Fusareum roseum), which makes the bread "pianyi," i.e. drunken, as the Russians say, because when eaten it has an intoxicating effect and causes nausea. Fruit is distinguished by richness in liquid but by a poverty of sugar. The Manchurian-Chinese cultivated plants and the natural native plant world thrive especially. Characteristic for the forests is a rich underwood, but the trees--and this applies especially to the deciduous trees--are very susceptible to disease, often becoming hollow with internal

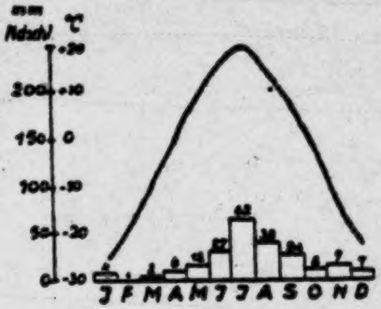
3: Thiel--68.K-4, 5 (no date) 1953 RR1 Siberia RR1

Climate Diagram

132

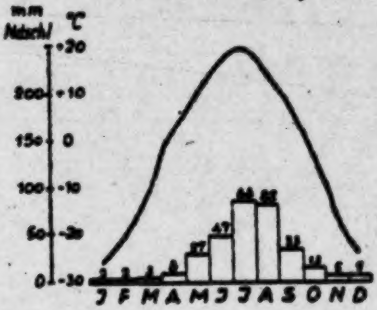
ULAN - UDE

562m - 202mm/Jahr



..CHITA

683m - 319mm/Jahr



132 rot, and they are generally short lived. The usual leather boots are
137 scarcely to be used when going into the summer-damp woods, since they soften up in the damp ground covering and disintegrate.

132 The best time of the year is autumn, lasting through September October. It no longer rains. The sun shines brightly from a blue sky and in the almost complete calm emits an agreeable, bearable warmth. Once the frost comes, it lasts through the entire winter. It is seldom interrupted by a spell of thaw. The great dryness of the air is remarkable, even snow often evaporates.

/67/ /Climate Diagram: Blagoveshchensk; Vladivostok./

The coastal climate dominates the entire coastal strip from Vladivostok in the south to the north beyond Okhotsk. Because of the coastal strip's variations in width there are climatic variations between individual sections, but only in a gradual sense. It is useful, however, to divide the area in two, and to treat the southern coastal area separately from that of the north.

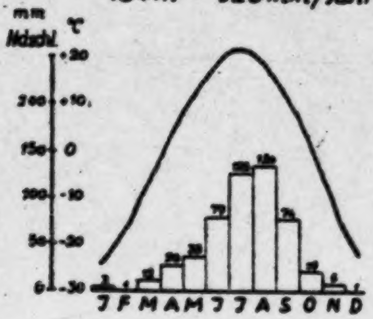
To the southern coastal area belongs the area from Vladivostok to the mouth of the Amur River. The hinterland is occupied in its entirety by the Sikhote-Alin'. Its principal chain acts as a climatic dividing line in summer and in winter. Despite the proximity of the ocean, the winter on the coast is marked by continental severity. It is more severe in the north, where a solid sheet of ice is formed between the mainland and Sakhalin Island, than in the south, where only a thin crust of floating ice is formed at the coastline. The entire coastal strip is subject to the cold, continental air masses pushing toward the sea. Nevertheless, temperatures on the coast are not as low as west of the Sikhote-Alin'. For one thing, the masses of air are forced down on their way to the sea, and this causes the temperature of the air to rise. Then there are also in-blowing winds, coming from the open sea, blowing even in winter, which contribute to the raising of the average temperature. In contrast to the winters, the summers of the coastal area show the characteristic traits of a maritime climate. The cool masses of air blowing inland from the sea are further cooled by the cold coastal current and contribute considerably to the lowering of temperatures in the coastal area, whereas to the west of the Sikhote-Alin', the influence of the sea on air temperatures is hardly perceptible anymore. The extent /68/ /Climatic Diagram: Okhost; Petropavlovsk/ to whichthe Sikhote-Alin' acts as a climatic dividing line in relation to temperatures is demonstrated in the contrasts between the two localities Ol'ga and Voroshilov (formerly Nikolsk Ussuriyskiy), both on

3: Thiel--70 K-4, 5(no date) 1953   RR1 Siberia RR1

Climate Diagram

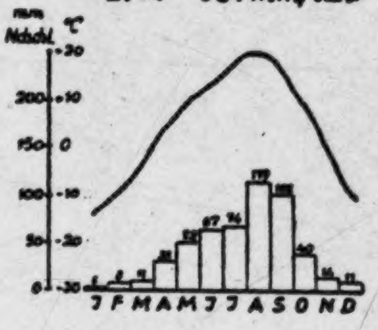
132 **BLAGOVESHCHENSK**

134 m - 525 mm/Jahr



VLADI VOSTOK

29 m - 537 mm/Jahr



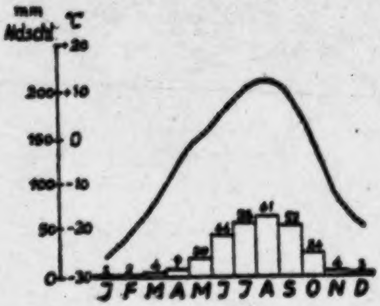
3: Thiel--7I K-4, 5 (no date) 1953 RR1 Siberia RR1

Climate Diagram

132

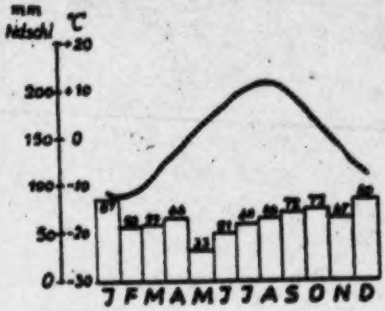
OKHOTSK

6m - 283mm/Jahr



PETROPA.VLO.VSK

102m - 772mm/Jahr



approximately the same latitude and separated by only 275 kilometers:

	Ol'ga	Voroshilov
January	- 11.7°	- 19.5°
July	19.0°	21.1°

Another mark distinguishing the maritime character of the summer climate in the coastal area is the delay in the hottest period of the year; for in all the localities along the coast from Vladivostok to the mouth of the Amur River August is the hottest month, whereas all stations in the interior register July as the hottest month. The longer transitional periods on the coast can also be interpreted in the same way. The transition is not as sudden as in the interior of the Amur and Ussuri areas. Hence there is a longer period of vegetation in the coastal area, reducing in length as you go toward the interior. Ol'ga, for example, has a period of vegetation lasting 185 days, Khabarovsk one of 172 days, and Blagoveshchensk one of 164 days. On the other hand, the raw and humid summer hinders the growth of vegetation. On the eastern side of the Sikhote-Alin' trees generally grow less high than on the western side. North of the 44th latitude mountains higher than 1,200-1,300 meters are usually bare. On the other hand no glaciers form because of the scarce rainfall in winter.

The annual rainfall in the coastal area is as a rule greater than in the Amur and Ussuri area. In the seasonal /69/ distribution of the rainfall, too, the coastal region has a different picture than the interior of the land. The concentration of the rainfall in the summer months is not so strongly marked. Spring and fall have a higher percentage of rainfall. In the following comparison of the monthly rainfall (in millimeters) of Ol'ga and Blagoveshchensk,[4] these traits appear clearly:

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Blagoveshchensk	3	1	12	26	38	79	128	136	74	19
Ol'ga	14	13	21	39	85	88	105	132	138	60

	Nov.	Dec.	Total for Year
Blagoveshchensk	5	1	522
Ol'ga	40	17	752

The contrast appears more sharply if the individual seasons are summerized together. (Figures are in millimeters):

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	winter	spring	summer	fall	year
Blagoveshchensk	5	76	343	98	522
Ol'ga	44	145	325	238	752

The different type of distribution of the annual rainfall goes back to the cyclone activity. The regular paths of cyclones in East Asia move toward the north with the beginning of and during the warm season. In the early part of the year they reach the coastal area, but they reach the Amur and Ussuri region only in the summer and then withdraw again toward the south; accordingly the coastal area is also visited by numerous cyclones in the fall. Thus the cyclone activity is more active in the early year and fall than in the summer; and accordingly the great part of the summer rainfall undoubtedly goes back to the monsoon winds. However, the entire phenomenon of cyclone activity and also the appearance of the ends of typhoons in the Soviet Russian Far Eastern region has still been too little investigated to make it possible to give more exact and final data. Vladivostok and also the southern Sikhote-Alin' are often, especially in late summer, visited by strong storms, which frequently can take on a typhoon-type, destructive character.

A further characteristic of the coastal climate is the frequent appearance of fogs. These arise where the surface water temperature is lower than the rest of the sea. That is the case in the cold stream off the coast. With the predominance of southeastern winds in the summer periods these warm air masses, satiated with dampness, are borne toward the continent. On passing over the cold water stream they quickly cool off, a phenomenon which is contributed to by the mixture with local, relatively cold air masses. With this the air masses are forced to separate off the excess of dampness brought along, and this happens in the form of fogs. These often /70/ envelop the entire coastal strip for days and are often driven into the land with their damp coolness. This makes especially noticeable the contrast between the completely fog-covered coastal strip and the interior of bays, which remain free of fog. The cape "Nizmennyy Mys" lying before Ol'ga Bay is regularly enveloped in fog on 26 days in June and July, while the city of Ol'ga itself, which lies within the bay and is separated from the entrance to the bay only by a low, forest-covered mountain, has only 9-11 foggy days during the same period. In many years, however, it also happens that the month of July brings fog on 21-22 days.

132 The northern coastal country, reaching from Nikolayevsk on the Amur in the south to Shelekhov Gulf in the north, has a rougher character than the southern part. Okhotsk has a mean temperature for January of -25.2°, while Leningrad--lying at approximately the same latitude--has a mean January temperature of only -7.6°. The raw climate of the summer is traceable not only to the northern position but also very much to the cooling influence of the Sea of Okhotsk with its ice masses, which are preserved along the coast until the beginning of summer. Furthermore, there are the effects of the cold ocean stream along the coast (from north to south) and the cold water strips (see description of the Sea of Okhotsk) with their fogs, which are driven into the coastal area by the constant sea wind, sometimes even going up the Amur to Bureya since no morphological hinderances stand in the way of the penetration of the sea air masses.

The winds have a clearly marked monsoon charater. In the winter they blow from the cooled-off continent toward the sea, and in the summer the opposite is true. But here the contrast in the strength of the wind is remarkable. As a result of the barometric contrast between land and sea of 22 millimeters, the winter monsoon is much more strongly marked than the monsoonal air movement of the summer since then the fall in air pressure is only 6-7 millimeters. Powerful land winds--not uncommonly with the character of a storm--predominate from October to March. In the same period Okhotsk has 83 percent north and northwest winds with a velocity of 5 meters per second and more and only 5 percent calm; Nikolayevsk, which lies 38 kilometers above the mouth of the Amur and thus is somewhat distant from the coast, still has 64 percent land winds with a wind velocity of 3.8 meters per second and only 14 percent calm. In the summer, on the other hand, Okhotsk has only 50-52 percent winds with a velocity of 3 to 3.5 meters per second.

The summer temperatures are very much lowered by the cooling effect of the Sea of Okhotsk, but the influence of this sea doesn't reach far into the land, and on the coast from the Uda Bay to Okhotsk it reaches as a rule only the nearby watershed. Thus the Sea of Okhotsk influences only the mountain slopes inclined toward the sea, while on the other side of the ridge the warm continental summer rules. /71/ Astonishing is the contrast noted by travelers coming in the summer from Yakutsk to the coast. Oppressive heat of 30° and more with a completely clear sky still exists not far from the coast, and the coast has cool, damp, foggy weather with cloudy, overcast skies. Every breath of wind coming from the interior to the coast brings welcome warmth, even heat, but also the unbearable plague of gnats unknown in the coastal area with its sea wind. Strikingly low is the June mean (Ayan 5.2°, Okhotsk 5.4°), but even August, the warmest month, reaches a mean of only 12-13° (Ayan 12.5°, Okhotsk 13.5°). The winter temperatures are markedly low, since the solid ice belt, which forms off the coast, and the floating ice, which covers the entire northern part of the Sea of Okhotsk, keep away from the coast the moderating influence of the sea. Nikolayevsk on the Amur has a mean temperature for January of -24.5°, Ayan one of -20.3°, and Okhotsk one of -25.2°.

The annual rainfall decreases generally from south to north. Okhotsk receives 283 millimeters of rainfall, and Nikolayevsk 447 millimeters. Ayan with a rainfall of 889 millimeters is an exception both in this and also in winter temperature; this is caused by local conditions. The annual rainfall along the entire coastal area is extraordinarily variable. In rainy years Nikolayevsk receives up to 701 millimeters; in dry years, on the other hand, it receives only up to 199 millimeters. The bulk of the rain falls in the summer and at the beginning of autumn; thus in this period 87 percent of the annual rainfall comes down in Okhotsk and 91 percent in Ayan.

Following the pattern of the rainfall, the cloudiness in summer is greater than in winter. As a mean this amounts in percentage:

	winter	spring	summer	autumn
Okhotsk	37	58	76	48
Nikolayevsk	42	56	60	55

The number of overcast days is largest in June, which has a mean of only 1-4 sunny days. Also the relative humidity of the air reaches 85 percent during this month, which is the maximum for the year.

The blossoming of the vegetation begins after the thawing of the snow cover at the end of May and the beginning of June. In the summer cool and damp days predominate. The winds constantly blowing from the sea often bring fog and a fine, heavily wetting drizzly rain. In late fall the winds abate, the weather is less rainy and is felt to be warmer, but already at the end of September the first snow falls, and the cold of winter sets in. The length of the vegetation period increases from north to south. In Okhotsk it amounts to 109 days (6 May to 24 September), in Nikolayevsk 138 days (22 May to

8 October).

132 The climate of the northern regions, comprising mainly the Anadyr' area and the Chukchi Peninsula, differs from the other areas in the Far East in the smaller effect /72/ of the monsoonal air circulation, in a long, harsh winter and a short, but comparatively warm summer; the mean temperatures of the warmest months exceed those of the northern coastal region and in part also those of Kamchatka. The farther away from the coast the less the monsoonal influence becomes, the annual range [illegible] temperatures increases, and the climate acquires continental tr[illegible]

In the vicinity of the coast the winter is still milder, the summer cool. Novo-Mariinsk /now: Anadyr'/, at the bay at the mouth of the Anadyr', has a July mean of 10.4° as opposed to Markovo which is at approximately the same latitude but lies 300 kilometers inland and which has a July mean of 14.1°. Markovo has three months with a mean over 10°, while Novo-Mariinsk /now: Anadyr'/ has only one month, the warmest, whose mean exceeds 10°. In the winter it is the reverse: Novo-Mariinsk /now: Anadyr'/ has a mean temperature for January of -23.3° and Markovo one of -28.7°. The rainfall is generally slight and, with the exception of the southeast (the coast of the Koryak Peninsula has 250 millimeters), nowhere exceeds 200 millimeters. In the summer half of the year, as a consequence of the predominant east winds, the coastal regions mostly have bad weather with numerous fogs, while in the same period dry, windless weather with clear skies and sunshine rules in the interior. Because of the greater warmth and because of the rainfall in the summer, there develop in the river valleys and in protected lowlands forests which consist of alders, willows, aspens, and birches, while in the coastal strip shrubbery at most appears; but mostly there is only tundra vegetation. However, the rule of the warm summer doesn't last long and is replaced by a cool, rainy fall followed already in September by the cold and snow of winter. Then north and northeast winds, which have a great velocity and which are feared for their snow storms, predominate. Many regions, especially mountains, are blown free of snow, while the snow is carried to other places to form great masses, which remain until the beginning of June and sometimes even until August.

Sakhalin

The climate of the island of Sakhalin, which stretches

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approximately from the latitude of Hamburg to that of Trieste, is completely included in the sphere of the coastal climate. The reason for the roughness of the climatic conditions at this latitude lies in the position of the island in the vicinity of the Asiatic continent, with its east Asiatic monsoon climate, and the nearness of the Sea of Okhotsk, with its cold water masses, the cold stream with floating ice floes, which stretch along the east coast into the first half of the warm season. Only in the southwestern part of Sakhalin Island is the climate milder, because of a /73/ branch of the warm ocean stream which comes from the south of the Sea of Japan; and it is for this reason that the west coast is milder here than the east coast.

The fact that the island stretches 950 kilometers from north to south and the two mountain chains, which traverse the island in the same direction and follow protectively the valley depression of the Tym' and Poronay lying between the mountain chains, create the differences in the climatic conditions and in the character of the landscape. The degree of coldness in the winter decreases with the measure of the distance from the northern end of the island toward south, while the summer temperatures are equalized. The mean of the coldest month changes from -23.4° in the valley of the Tym' (Kirovskoye) to as much as -8° at the southern tip of the island (Cape Crillon). There is a much smaller difference in the summer temperatures, which are 15° in the central part and 17° in the south. The absolute minimum varies from -48° in the north to -31° in the south. The vegetation period increases significantly in length from north to south. At the northern end it is only 97 days (Okha), in the valley of the Tym' it is 146 days (Kirovskoye), and at the southern end of the island it is 167 days (Korsakov).

The protected central valley depression and the open coastal plains, subjected to the influence of the cold ocean with its constant fogs, show very great differences in thermic conditions, especially in winter; but in summer there are almost no differences. While the January temperatures are -16.6° on the west shore and -23.4° in the central depression, the warmest month on the west coast (August) has a temperature of 16.2°, and the warmest month in the central depression (July) also has a temperature of 16.2°. The difference in the warmest months points to the more continental climatic character of the central depression, which is protected from the influence of the sea; in this depression the warmth rises as high as 32° in the summer, and in the winter the temperature can sink to as low as -48°. The

132 mean annual temperature variation reaches 39.6° here, while it is 35.3° on the west coast and only 32.8° on the east coast. In comparison with the coast, the central valley depression has more calms, or winds of less velocity. The fog from the coasts, which is brought in by the winds at greater heights over the valley, looks like gray clouds and at most causes a light drizzling rain.

The west and the east coasts lie under the influence of two other seas differing in their temperatures. Near the southwest coast flows a branch of the warm stream coming from the Korean Strait. Only at the beginning does it touch the banks, and then it is pushed from the banks by a cool stream of less size coming from the La Perouse Strait; this cool stream at first accompanies the warm one. The northern part of the west bank and the east bank are, on the contrary, subjected to the influence of cold water masses, which appears on the banks in the west as water driven up /Auftreibswasser/ and in the east as a cold stream. The cold /74/ surface water of the Sea of Okhotsk is the reason for the summer covering of fog, which often hangs for weeks on the banks.

The northeastern and northern winds which in the winter blow over the Sea of Okhotsk, which is cool but not frozen over in the southern part, moderate the coldness of the winter and bring relatively heavy snowfall with frequent snow storms (buran). As a result of the predominant east winds with their fog, the summers are very cool: nowhere does July have a mean above 12°. On the west banks 600 to 800 millimeters of rain falls a year, and of this approximately half falls as snow. The summer is rainy. In July and August there is rarely a day without rain. September generally has the maximum rainfall, and February the minimum. The relative humidity of the air is very high all year round, and amounts on the average to 77-89 percent. While the mountain chains show a certain differentiation in climate in the south, this is not the case in the north of the island, where the mountains flatten out.

The winter period lasts 7 months in the north, 5-6 months in the south. March still has the character of winter everywhere, its mean being -5.3° in the south and more than -11.2° in the north. It is especially distinguished by the appearance of snow storms. For most of the winter the snow lasts no less than 200 days. At the same time the storms provide a very uneven distribution of snow, with many areas remaining free of snow, while in the valley depressions and basins

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the snow masses pile up and often can even completely bury human dwellings. Solid ice seldom forms on the east coast even though floating ice floes can often be found on the sea even in June. The Strait of Tatar regularly becomes a solid ice bridge with the continent from December to March. Floating ice forms in the middle of the winter off the southwest coast and in the La Pérouse Strait. Spring is unfriendly and brings frost even in the beginning of June. Summer lasts only 2 to 2 1/2 months in the north, where only July and August are frost-free. The rainfall of summer consists mostly of light but continuous rain. The frost-free period begins earlier in the central depression and on the southwest coast; here June already brings higher temperatures, and July shows the full unfolding of summer. Autumn last two months and is warmer than spring, although the first frost appears in the north of the island in September.

The climatic conditions, especially in the north of the island, are not very favorable to agriculture. Along the flat coastal strip, covering an extensive area in various places, is tundra vegetation with Arctic flora; even today reindeer graze here--approximately /75/ at the latitude between Hamburg and Hanover. The conditions are most favorable in the central depression and on the southwest coast. Here summer wheat, summer rye, oats, and barley flourish.

Kamchatka

The climate of Kamchatka is rougher than could be expected from its latitude. The climate is determined by the peninsula's position between continent and ocean and its closeness to two cool seas and cold ocean streams; however, the coasts are significantly milder in climate than the coast of the neighboring continent. The winds have a monsoonal character. In the winter they blow from the Asiatic continent to the ocean, i.e. northwest winds predominate; in the summer, on the other hand, east and northeast winds predominate. Both in duration and strength the winter monsoon far exceeds the summer one, which appears only in June. In Petropavlovsk the winter monsoon has a mean velocity of 8.1 meters per second; the summer one has a mean velocity of only 4.2 meters per second. In this it must be taken into consideration that the northern half of the Sea of Okhotsk is for the most part covered with ice in the winter and acts as a climate extension of the continent.

But within this general air circulation appears a second, regular air movement, caused by local conditions; this second air movement in part works against the monsoonal one and plays a not unimportant role in the climatic conditions. In the winter there forms in the center of Kamchatka an area of high air pressure, which, in the form of a narrow tongue, extends into the peninsula from the northeast of the continent and coincides approximately with the Kamchatka Valley, which is protected by mountains on the east and the west; accordingly the air pressure decreases from north to south. The air masses flowing from this high pressure area of their own fall in with the direction of the general monsoon in the east; on the west side, on the other hand, they work against the general monsoon. For this reason the winter monsoon on the east coast (Petropavlovsk) is stronger than on the west coast. In the summer an opposite development is completed within the peninsula. A barometric depression forms over the protected Kamchatka Valley, and accordingly the local winds arising thereby in the east again fall in with the general monsoon direction, while the local winds in the west move against it. These conditions explain the fact that the monsoonal winds both in summer and in winter appear as a typical phenomenon only in the coastal strip, while toward the interior of the peninsula it occurs as a local deviation. The general monsoonal effect in the eastern part of the peninsula is strengthened by local influences. Irregularity and change in the general picture brings the appearance of Pacific cyclones, which, however, have still been very little investigated. In winter their appearance is coupled as a rule with northeast winds.

/76/ /Sketch Map of the Wind Directions:/

The great stretch of the peninsula from north to south, along with the morphological division, changes the general face of the climate in the individual provinces. Characteristic is the decline in the winter temperatures with the distance from the coast and the rise in the summer temperatures and the annual variation in temperature in the same direction. We find the lowest winter temperatures in the Kamchatka Valley, where Mil'kovo has a January mean of -25°, while the coasts have higher temperatures: thus Ust'-Bol'sheretsk on the west coast has a mean of -15.1° and Petropavlovsk on the east coast has one of -11.2°; these last two figures are the mean for February /77/ /Sketch Map of Wind Directions:/ which here is the coldest month. This, too, is a characteristic sign of the contrast between the coastal zones and the interior. In April the temperatures are almost completely the same throughout the peninsula. In summer the interior is again warmer (Klyuchi, July mean 14.7°), while the coasts are relatively cool: thus

Sketch Map of the Wind Directions:

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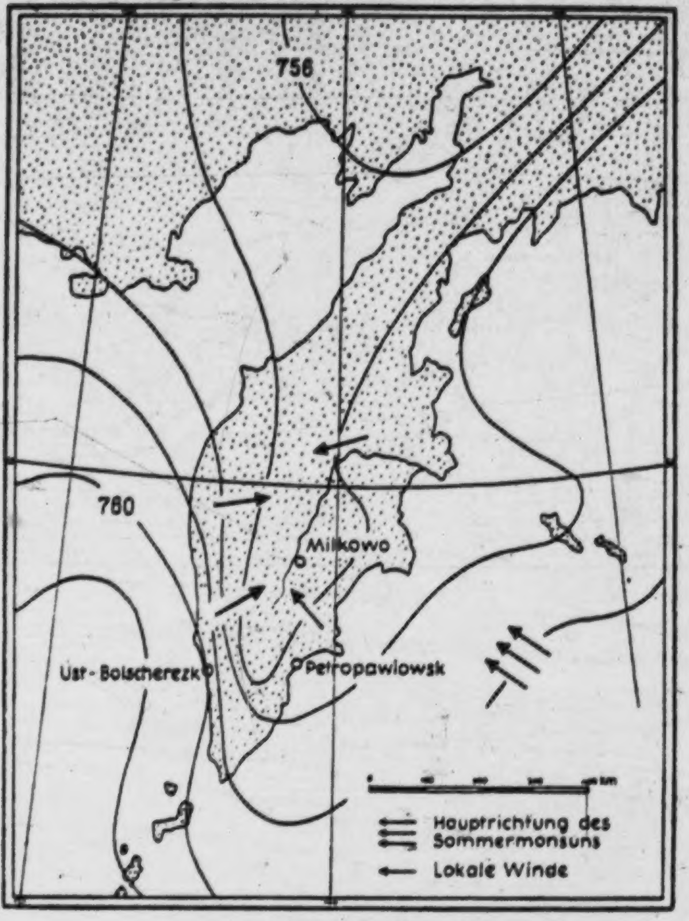
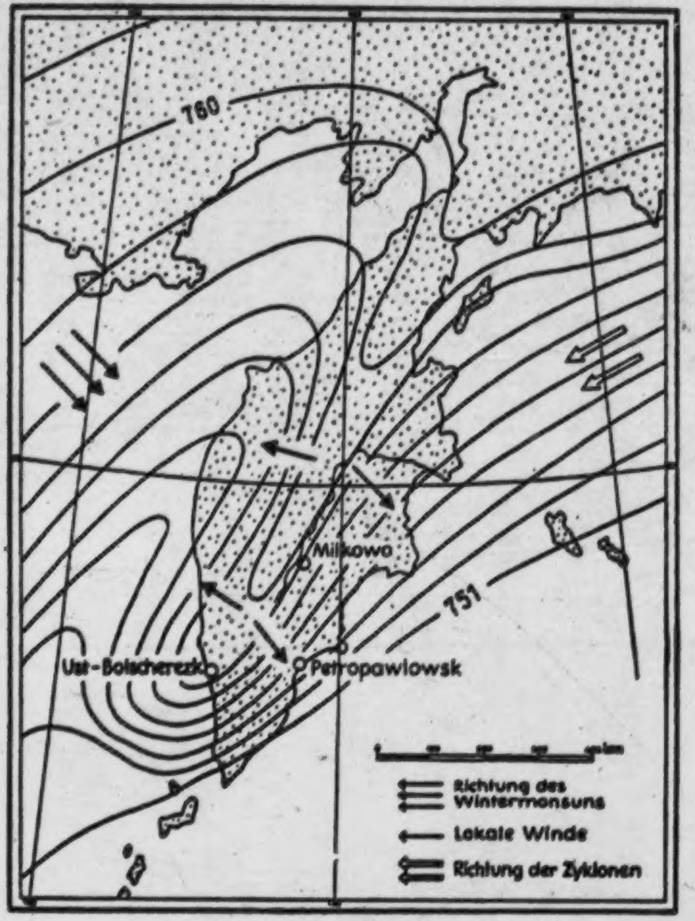

756
760
Milkowo
Ust-Bolscherezk
Petropawlowsk
km
Hauptrichtung des Sommermonsuns
Lokale Winde

⇚ Main Direction of the Summer Monsoon

← Local Winds

Sketch Map of Wind Directions:


760
751
Milkowo
Ust-Bolscherezk
Petropawlowsk
Richtung des Wintermonsuns
Lokale Winde
Richtung der Zyklonen

← Direction of the winter monsoon

← Local winds

⇐ Direction of the cyclones

Ust'-Bol'sheretsk has a mean temperature for August of 12° and Petropavlovsk one of 11.9°. In October the temperatures are again even over the entire peninsula. The absolute maximum of 28° and the absolute minimum of -50° have been determined in the Kamchatka Valley, where, too, the greatest daily variation of more than 15° has been measured. /78/ In Kamchatka the vegetation period begins around the end of May or beginning of June and ends the beginning of October. It lasts the longest in the interior of the peninsula, while it is significantly shorter on the coasts and in the north. Thus in Klyuchi the length of the vegetation period is 134 days, in Petropavlovsk it is 127 days, in Ust'-Bol'sheretsk 107 days, and in Tigil' (in the north) only 96 days.

The annual rainfall generally decreases from the southeast of the peninsula, where it is more than 800 millimeters, to the northwest, where it sinks to 350 millimeters and less. The coasts receive the greatest rainfall, while the Kamchatka Valley is prominent for its slight rainfall. The number of days with rain ranges between 120 and 200, the number of days with snowfall ranges between 70 and 96. Characteristic of Kamchatka is the great duration of the snow covering, which generally remains almost until the end of May and in the mountains often remains even into June; however, the appearance of the first snow is very late in comparison with the neighboring regions of the Far East. September is as a rule still without snow. In the annual distribution of the rainfall there are two high points--summer and winter--while spring and fall bring slighter rainfall. The relative humidity of the air is higher in winter and summer than in the transitional seasons, and in this the coastal zones exceed the interior. The maximum on the coast (Petropavlovsk) has been recorded in August when it is 87 percent.

Clouding is greater in summer than in winter, but the difference is not so great as in the other regions in the Far East. Within Kamchatka, naturally enough, the coastal regions show a greater clouding. On the west coast (Ust'-Bol'sheretsk) it reaches 89 percent in July, 67 percent in December, while in the Kamchatka Valley (Mil'kovo) it is 69 percent in July and only 49 percent in December. Very sharply marked is the difference between the coasts and the interior in the number of bright, overcast, and foggy days: (Table on following page)

Characteristic of the coastal regions of Kamchatka, especially in summer, are the thick fogs which give the traveler a gloomy impression of the land. In Petropavlovsk it is foggy almost every second day. Fogs dominate the west coast even more, while in the interior

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Relative Numbers of Bright, Overcast, and Foggy Days

	January			July		
	bright	overcast	foggy	bright	overcast	foggy
Ust'-Bol'sheretsk	2	14	1	0	25	25
Mil'kovo	18	6	3	3	16	0

fog very seldom occurs in the summer.

Kamchatka can be divided into three regions according to the climate differences: the east coast, the west coast, and the interior.

/79/ The east coast lies under the oceanic monsoon in summer; in winter, apart from the north winds, it lies under the Pacific cyclones coming from the northeast and generally under the cold ocean stream, especially in the north, while in the southern part of the coast the moderating influence of the Pacific is more noticeable. The southeast coast, therefore, with a temperature range of 23.1°, has the smallest annual range in temperature. Winters along the east coast are generally mild (February -11.9° to -13.9°), and the summers are cool (August 11.9° to 12.5°). The nearness of the ocean postpones the extreme months to February and August. The ground freezes only to a slight depth (10 centimeters). In contrast to the other monsoon areas in the Far East there is only a slight difference in rainfall between summer and winter. In this connection the east coast is distinguished by an abundance of winter rain in contrast to the other parts of the peninsula, especially in contrast to the interior. This abundance of winter rain on the east coast is brought by the northeast winds coming from the sea with their cyclones; these cyclones can often bring great quantities of rain in a brief period. Thus 189 millimeters once fell in Petropavlovsk in one day in October (205). In certain winters, especially warm ones, there is often more rainfall than in the summer half of the year. As a consequence the east coast has a high snow covering with a mean of 130 centimeters, in individual cases even of 300 centimeters (March, 1916). The southeast coast is especially notorious for its days with snow storms and snow drifts. Not uncommonly the snow drifts go up to the roofs of the houses in Petropavlovsk. The snow thaws in May to the beginning of June. In some years the volcanic ash which falls down has an accelerating effect on the thawing of the snow. Summer

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205. Suslov, S.P., Fizicheskaia geografiia SSSR /Physical Geography of the USSR/, (Moscow-Leningrad, 1947), p. 371.

on the east coast is distinguished by heavy clouding and numerous fogs. In July as a rule half the days are foggy. 132

The western coastal area is more under the influence of the Sea of Okhotsk and is dominated in winter by the cold and dry monsoon and northeast and east winds, which come from the center of the peninsula and which are cold and dry, in contrast to the east coast. For these reasons the rainfall in the winter is only a fraction of the summer rainfall: the winter rainfall is only a fourth to a third of the summer rainfall. The snow covering on the west coast is therefore slight, generally reaching only 40 centimeters. However, the distribution is uneven since the winds coming from the mountains often blow the mountains free of snow and pile the snow in the troughs and valleys. However, in contrast to the east coast, snow storms are a rare phenomenon. Summer is cool and especially foggy, the clouding is very great. The local winds, which move into the interior of the island, often carry fog into the land for days and bring a damp coolness, which is of little help to plants. /80-81/Charts on following pages/ /82/ The vegetation period is significantly shorter on the western side of the peninsula than on the eastern side.

The peninsula's central depression, which for the most part is occupied by the valley of the Kamchatka River, is extensively protected from the influences of the sea by two mountain chains on the east and the west; accordingly clearly marked, continental traits can be recognized in the climatic conditions here. Summer is warmer and drier than on the coasts; winter, on the other hand, is harsh but brings less snow than on the east coast, though even more than on the west coast. Characteristic of the central depression are the rapid transition from winter to summer and the warm autumn; accordingly we find here the longest vegetation period on the peninsula. The stone birches unfold their buds already in the middle of May here, while they appear in the coastal areas only around the 15th of June. As a consequence of this favorable condition, Kamchatka's central depression is most favorable for agriculture, which has already spread here on a large scale, while the coastal areas offer more opportunities for developing animal breeding.

The Border Seas of the East

Through its possession of the Kurils and southern Sakhalin, the Sea of Okhotsk has become a Soviet Russian internal sea since 133

3: Thiel--86 K-4,5 (no date) 1953 RRI Siberia RRI

/80/ Mean Air Temperatures in Degrees Centigrade

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Transbaykal													
Barguzin	-27.0	-23.4	-12.1	-0.3	7.6	15.0	18.2	15.8	8.6	-0.6	-12.8	-23.8	2.9
Ulan-Ude	-26.7	-21.7	-11.9	0.5	8.1	16.2	19.2	16.4	8.4	-0.9	-13.0	-22.5	-2.2
Troitskosavsk /now: Kyakhta/	-23.1	-19.0	-9.8	1.6	9.4	16.7	19.2	16.5	9.0	0.1	-10.8	-19.1	-0.8
Chita	-27.4	-22.3	-12.4	0.0	7.9	15.7	18.7	15.4	8.2	-1.7	-14.5	-24.1	-3.0
Nerchinsk	-31.4	-25.5	-15.0	-0.2	9.5	17.2	20.5	17.0	9.6	-1.8	-17.0	-28.9	-3.8
Amur-Ussuri-Area													
Blagoveshchensk	-24.2	-18.1	-9.5	2.4	10.4	17.4	21.2	18.7	12.1	1.4	-11.4	-21.6	-0.1
Khabarovsk	-23.1	-17.4	-8.8	2.8	10.9	16.7	20.2	19.6	13.6	4.2	-8.3	-19.4	0.9
Bikin	-22.2	-17.4	-8.7	3.7	11.9	17.0	20.4	20.3	12.6	4.7	-8.0	-19.3	-1.2
Coastal Area													
Vladivostok	-13.7	-10.1	-3.7	4.4	9.5	13.6	18.1	20.6	16.5	9.3	-0.5	-9.6	4.6
Ol'ga Bay	-11.7	-8.8	-2.8	-4.2	8.6	12.4	16.9	19.1	14.5	7.1	-1.8	-9.7	4.0
Nikolayevsk	-24.5	-19.8	-12.7	-2.6	3.6	11.4	16.7	16.1	11.4	2.0	-9.9	-20.1	-2.1
Ayan	-20.3	-15.7	-10.1	-2.8	1.7	5.2	12.2	13.5	10.1	0.2	-10.6	-17.6	-2.9
Okhotsk	-25.2	-20.5	-14.5	-6.0	0.3	5.4	11.7	12.5	8.1	-2.3	-15.4	-21.9	-5.7
Kamchatka													
Petropavlovsk	-11.0	-11.2	-7.2	-2.0	2.2	6.7	10.6	11.9	9.2	3.9	-2.5	-7.6	0.2

(Chart continued on following page)

/80/ Mean Air Temperatures in Degrees Centigrade

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Bol'sheretsk	-13.6	-15.1	-10.1	-2.5	2.1	5.0	11.0	12.0	7.8	2.4	-3.5	-10.2	-1.2
Sachalin													
Aleksandrovsk	-19.1	-15.6	-9.6	-0.2	5.2	10.8	15.5	16.2	12.0	4.1	-5.6	-13.9	0.0
Korsakov (Otomari)	-11.2	-8.9	-5.3	-1.2	5.3	9.6	14.5	16.8	13.7	7.2	-0.6	-7.2	2.8
Far North													
Markovo	-28.7	-25.7	-23.3	-15.2	-2.4	10.0	14.1	10.1	3.0	-8.6	-19.7	-26.3	-9.4
Novo-Mariinsk /now Anadyr'/	-23.3	-21.3	-19.9	-14.9	-3.8	4.9	10.4	9.4	3.7	-4.8	-15.1	-21.5	-8.1

3: Thiel--87 K-4,5 (no date) 1953 RRI Siberia RRI

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3: Thiel--88 K-4,5 (no date) 1953 RRI Siberia RRI

/81/ Rainfall and Distribution in Millimeters

	Height in meters	Annual total	Summer half of the year	Winter half of the year	June, July, August	December, January, February
Transbaykal						
Barguzin	500	200	200	60	131	29
Ulan-Ude	542	202	179	33	127	12
Troitskosavsk /now: Kyakhta/	760	280	256	24	161	10
Chita	683	319	285	34	217	9
Nerchinsk	484	281	249	32	180	10
Amur-Ussuri-Area						
Blagoveshchensk	134	522	481	41	343	5
Khabarovsk	50	564	487	77	349	18
Bikin	73	616	496	120	308	29
Coastal Area						
Vladivostok	29	537	446	91	260	24
Ol'ga Bay	45	752	587	165	325	44
Nikolayevsk	21	447	300	147	168	48
Ayan	10	889	665	224	441	36
Okhotsk	6	283	244	39	163	7
Kamchatka						

(Chart continued on following page)

/81/ Rainfall and Distribution in Millimeters

	Height in meters	Annual total	Summer half of the year	Winter half of the year	June, July August	December, January, February
Petropavlovsk	102	772	348	424	177	215
Bol'sheretsk	10	525	389	136	207	52
Sachalin						
Aleksandrovsk	16	600	335	265	174	104
Korsakov (Otomari)	37	494	304	190	325	77
Far North						
Markovo	26	200	142	58	103	25
Novo-Mariinsk /now: Anadyr'/	5	189	138	51	94	25

3: Thiel--89 K-4,5 (no date) 1953 RRI Siberia RRI

132

World War II. It is separated from the Pacific Ocean by the barrier of the garland chain of the Kurils, where the numerous openings, which are only of slight depth, allow but a surface exchange of water. There are two connections with the Sea of Japan: La Perouse Strait and the Tatar Straight. The latter has been shut off by a dam connecting Sakhalin with the mainland since 1952. For the rest, the Sea of Okhotsk washes against the western side of Kamchatka, the mainland coast, and the north and east coasts of Sakhalin.

The Sea of Okhotsk

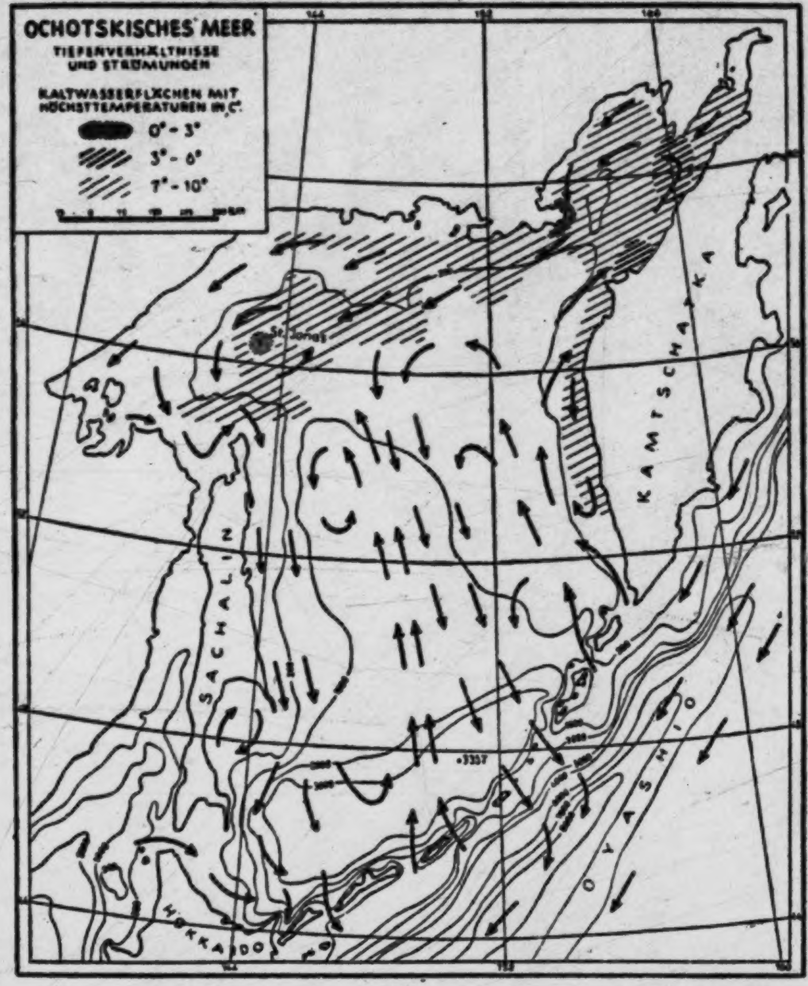
The northern coast seems more divided up than the other coasts. the Taygonos Peninsula divides the great Shelekhov Bay into the Gizhiga and Penzhina bays. West of Cape Koni the Tauyskaya Bay penetrates into the land, and in a part of this bay--the Nagayevo Bay--lies the harbor of Magadan which has become very well known in recent years. In the extreme west, where the mountain chains stretch into the sea, land and water penetrate one another and cause a disturbed, horizontal division; the Shantar Islands lying off the coast contribute to this. Apart from these islands and some coastal islands in the north, the Sea of Okhotsk is poor in islands; only the rocky /83/ /Map of the Sea of Okhotsk:/ St. Jonas Island lies alone in the watery area of the western part. For the rest the coasts appear strikingly rectilinear. On the west coast the mountains run parallel to the coast and slope to the coast in a steep descent. Flat approaches to the sea are found only at the mouths of rivers or behind bays. On the other hand the coasts of Kamchatka and Sakhalin are overwhelmingly flat.

/84/ The greatest depth in the Sea of Okhotsk lies in the south, where a channel more than 3,000 meters deep stretches parallel to the Kurils; the greatest depression here is as much as 3,374 meters. From this deep sea valley the bottom of the sea rises steeply to the barrier of the Kurils, and then on the other side of these islands, it declines sharply to the long Kurils deep sea graben which is more than 8,000 meters deep. Toward the north, on the other hand, the bottom of the sea rises gradually. There the 200 meter-deep line runs along the coast at a distance of from 150 to 200 kilometers.

The main part of the water balance of the Sea of Okhotsk is equalized by the continual influx from the Pacific Ocean, just as in reverse there is a constant outflow from the sea to the ocean; also a limited exchange of water with the Sea of Japan via La Perouse Strait.

132
133

Map of the Sea of Okhotsk:


OCHOTSKISCHES MEER
TIEFENVERHÄLTNISSE UND STRÖMUNGEN
KALTWASSERFLÄCHEN MIT HÖCHSTTEMPERATUREN IN C°
0° - 3°
3° - 6°
7° - 10°
St. Jonas
SACHALIN
KAMTSCHATKA
OYASHIO
HOKKAIDO
3357
144
152
160

Depths and Currents; Cold water areas with highest temperatures in degrees centigrade takes place. The Pacific surface water enters the Sea of Okhotsk through one series of sea connections between the Kurils, while through others there is a surface flow of water from the sea to the ocean. At the deeper levels of water the exchange works in the opposite direction from that on the surface. Since only four of the sea straits between the Kurils are over 500 meters deep, and of these only two are over 1,000 meters deep, and since, in addition, their breadth is very slight, the exchange of deep water is kept within very limited borders and has as good as no influence in the sense of an equalization of temperature between sea and ocean. In this the bulk of the water layers of the Sea of Okhotsk, which lie more than 1,000 meters deep, cannot be drawn at all into an exchange. 133

Even though the picture is somewhat confused by the numerous openings and their various current directions, a clear sea current can nevertheless be recognized within the Sea of Okhotsk; this sea current moves counterclockwise along the coast. It enters the Sea of Okhotsk south of Kamchatka Peninsula and moves toward the north along the west coast of this peninsula; in the north, however, it is pushed somewhat off the coast by a cold water stream coming from the north. In Shelekhov Bay the current turns and follows the coast toward the west. This turn in the bay and the slanting stretches following the coast lead to the presence of cold water upwelling /Auftriebwasser/, which is drawn into the general current; this general current then follows the west coast farther, washing up around St. Jonas Island. Strengthened by the influx of water from the Amur, the current then runs along the east coast of Sakhalin toward the south, where it unites with the water stream coming from La Perouse Strait, and then again reaches the Pacific Ocean through the southern gaps of the Kurils. The currents in the middle of the Sea of Okhotsk fit into the framework of the main current described.

Tides appear on all of the Sea of Okhotsk. The tidal wave comes from the Pacific Ocean and enters the area of the Sea of /85/ Okhotsk through the gaps between the Kurils; the tidal wave is strongest in the middle of the island chain and then spreads out almost equally. The range has a mean of 4 meters in the open parts of the coast, but in the interior of the great bays it grows strong and reaches, for example, 11.3 meters in Gizhiga Bay.

The long, cold winter with its raw winds blowing from the mainland causes a marked cooling off of the water; the short and cool summer with predominantly heavier clouding and numerous fogs brings 132/133

132 133 only a slight warming up; and accordingly the temperature of the surface water layer rises only a little above 10° in the summer. This seasonal rise in temperature applies, however, only to the water levels to a depth of at most 30 to 50 meters, while the layers lying under this have a constant temperature, which is negative /in Centigrade/. Investigations have shown that the water temperature at first gradually decreases as the depth increases and then with a leap the water temperature reaches 0° already at a depth of 15 meters. Then the temperature lowers only very slowly, reaching -1.5° at depths from 75 to 150 meters. Then follows a slow rise in temperature until the bottom of the sea, where a temperature of 1.2° dominates in the north and one of 2.5° dominates in the southern part of the sea. With the formation of ice and the crystallization of salt, the surface waters can become so thick that they sink toward the depths.

Characteristic of the Sea of Okhotsk are constant cold water zones, which are a permanent phenomenon in certain areas and which give these parts of the sea a special stamp. These cold water zones are related genetically to the current conditions and can be explained as upwellings /Auftriebswasser/. Three such regionsshould be named above all: the one off the Yama Bay in the area of the Yamsk Islands; the one around Jonas Island; and the third in the open sea approximately between the north end of Sakhalin and the Shantar Islands. Within the first two cold water areas mentioned, the water temperature never rises above 1°, and in areas around these places it always remains 3° to 5° below the mean temperature of the sea. Off the entrance to the Penzhina Bay the water temperature even in high summer is never higher than 5° to 6°. The current emptying into the Shelekhov Bay turns here within the bay again toward the exit and draws upwelling /Auftriebswasser/ from the smaller bays toward it; the appearance of the latter off the Yama and also the Penzhina bays is especially striking. From the Yama Bay the cold upwelling stretches toward the southwest and thus in the direction of the general current; in this the upwelling water gradually and partially warms up on the surface or in part also sinks down, but certain cold water stretches are nevertheless recognizable. The sea bottom elevation of the massif around Jonas Island, it is assumed, causes /86/ again the rise of cold water layers, which are very characteristic of the environs of the island. The water is never warmer than 1° in the vicinity of the island and never more than 1° to 3° a bit farther off the island. The cold water zone lengthens from Jonas Island then toward the south, where there is still further

cooling off between the Shantar Islands and the north end of Sakhalin; 132
the cause of this is regarded as the strengthening of the general cur- 133
rent by the addition of the water masses of the Amur.

The cold water zones are noticeable in summer because of the heavy formation of fog, which becomes heavier in relation to the contrast between the air and the water temperatures. For weeks in the summer there often lies over these regions thick banks of fog, which clear up only with bad weather. Nowhere in the Sea of Okhotsk is the fog so constant and so thick as in the area of the Yama Bay and around Jonas Island. The winds contribute to the spreading of the fog, and accordingly it also appears over regions with relatively warm water. But the source of the fog is clearly the cold water areas, where new masses of fog always form. These masses of fog are characteristic for the entire north of the Sea of Okhotsk and hinder sea traffic.

Since the Sea of Okhotsk projects far into the mainland mass of the continent--the low winter temperatures are, of course, known--a solid ice covering forms already in December along the entire coast from the Strait of Tatar in the south to Penzhina Bay in the north. In February the entire northern half of the sea is covered with floating ice, and the ice floes are often shoved together into a closed covering until a storm again tears them apart. Only by the middle of June is the bulk of the sea entirely free of ice. Further discussion of the ice covering and its significance for man is given in the section on sea transportation.

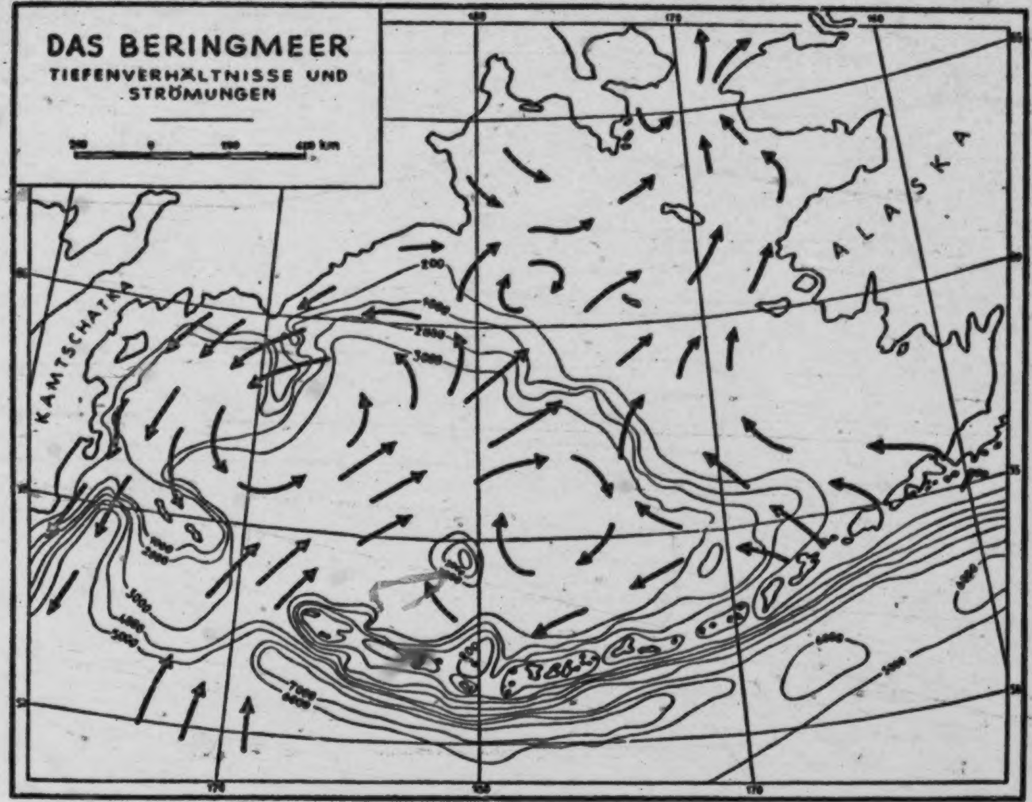
The salt content of the Sea of Okhotsk is slighter than in the 133
neighboring seas and varies between 32 percent and 32.5 percent. The salt content increases with the depth and reaches 33.5 percent to 34.5 percent at the bottom of the sea.

The Bering Sea

The Bering Sea is the most northerly border sea of the Pacific Ocean, from which it is separated by the islands of the Aleutian chain. However, the closing between the Bering Sea and the Pacific is not so shut off as is the case with the Sea of Okhotsk, since between the Commander Islands and the beginning of the Aleutian chain there is a connection which is up to 342 kilometers wide and up to more than 3,000 meters deep. Accordingly an exchange of water up to this depth can go on unhampered. The connection via the Bering Strait /87/ /Map of the Bering Sea:/ /88/ to the northern Polar Sea has, on

3: Thiel--95 K-4, 5(no date) 1953 Rd1 Siberia RR1

Map of the Bering Sea:


DAS BERINGMEER
TIEFENVERHÄLTNISSE UND STRÖMUNGEN
200
0
200
400 km
KAMTSCHATKA
ALASKA
180
170
200
1000
2000
3000
4000
5000
6000
7000

Depths and Currents

133

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the other hand, a width of only 35 kilometers and a slight depth of up to 59 meters; accordingly the influence of the cold polar water from the Chukchi Sea is limited to a minimum. As a result of this there is an overwhelming equalization of the Bering Sea with the Pacific Ocean, which, however, has different facets according to the structure of the sea basin.

The Bering Sea can be divided into two parts according to the relief of the sea floor. The northeast as far as a line from approximately Cape Navarin on the Russian side to Unimak Island off the west end of the Alaskan peninsula rests on a mainland shelf, and everywhere has depths of less than 200 meters. This part comprises 44 percent of the entire area of the sea. From the above-mentioned line the sea floor declines very precipitously toward the south to depths of from 2,000 to 4,000 meters; thus this part of the Bering Sea is a deep sea basin. The portion of this part in the total area of the sea is 43 percent. The remaining 13 percent belongs to the sloping of the mainland parts to deep sea basins with depths of 200 to 1,000 meters. The greatest depth in the Bering Sea is 4,100 meters. (205)

205. Suslov, S.P., Fizicheskaia geografiia SSSR /Physical Geography of the USSR/, (Moscow-Leningrad, 1947), p. 226

The varying relief of the floor of the Bering Sea with the steep rise from deep sea basins to the shelf produces very complicated current conditions. The main stream of the Pacific water enters the Bering Sea through the main gate between the Commander Islands and the Aleutian Islands and turns toward the northeast in the direction of the Bering Strait. However, upon hitting the border of the shelf the current divides into an eastern and a western branch, with the eastern one remaining within the deep sea basin and ending in a circle-shaped current moving counterclockwise. The western branch also remains in part in the deep sea basin, and in the central part also becomes a circle-shaped current, moving, however, clockwise. A part of this western branch, however, reaches the mainland coast in the west and in Olyutorski Gulf draws up, to the surface cold water /Auftriebswasser/ in passing by which continues along the coast of Kamchatka toward the south. It leaves the Bering Sea with a strong current between Kamchatka Peninsula and the Commander Islands, and then in a relatively cold state unites with equally cold water coming from the Sea of Okhotsk, and becomes the Oyashio /Okhotsk Current/.

A part of the entering mainstream of the Bering Sea enters the shelf /133 and with moderate speed draws in a northward direction over the Bering Strait into the Chukchi Sea. This current is reinforced by another Pacific current that presses in over the Unimak Sea strait (west of the island of the same name), immediately contacts the shelf and then flows alongside the west coast of Alaska along with the central current, and then via the Bering Strait into the Polar Sea. The accompanying sketch map serves to orient the reader as to further details on the currents of the Bering Sea.

For the most part the surface water temperature depends upon /132 the general climatic conditions. Located in high latitudes /89/ and /133 situated in between the mainland mass of northeast Siberia and northwest America with their long and servere winters, the Bering must be designated as a very cool sea. In the summer the surface waters along the shelf areas manage to warm up only to a limited degree and then, apart from the warm currents, reach temperatures of only 7 to 9 degrees. The surface water in the deep sea basin is as a rule warmer and reaches a warmth of from 10 to 11 degrees. It is of special significance and worthy of note that the surface waters of the Bering Sea, because of the permanent inflow of warm water from the Pacific throughout the whole year, cause the temperature of the Bering Sea to have a year-round temperature higher than that of the air. A. A. Borisov (39) has published the following table:

Month	Water Temperature	Air Temperature
January	-1.0°	-3.8°
April	1.6°	-0.9°
June	10.3°	8.5°
October	6.9°	4.3°
Annual	4.7°	2.1°

Because of the exchange of deep waters with the Pacific Ocean, the deep-water temperatures of the Bering Sea are completely different from those of the Sea of Okhotsk. From a summer surface

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39. Borisov, A. A., Klimaty SSSR /The Climate of the USSR/, (Moscow, 1948), p. 122.

132 temperature of 10°, at a depth of 30 to 40 meters, the temperature
133 gradually drops from 4° to -6°. At 100 to 150 meters lies the coldest water level, with a temperature of from 0.5° to 1.0°. Below this depth, at from 200 to 500 meters, the temperature again rises to as high as 3.5° and then gradually drops again to from 1° to 2° at depths from 2,000 to 3,000 meters. The coldest surface water is found in the Olyutorski and Anadyr' bays. Both are characterized by constantly rising deep waters and especially strong clouding. The cold, southward-flowing current along the east coast of Kamchatka also creates thick fog banks, which are a special feature of the Kamchatka coast.

133 The salt content of the Bering Sea is, in general, high, reaching 32 percent at the surface and rising at a depth of 3,000 meters to 34.5 percent. It is only in the extreme north that the salt content diminishes, becoming at this point 27 percent, because of the influx of fresh water from the Anadyr' and Yukon.

During the winter all along the coast of the northern part of the Bering Sea, a solid ice sheet forms, in front of which is a broad area covering with floating ice floes, which also cling to the east coast of Kamchatka. The edge of the floating mass of ice runs somewhat south of the rim of the ice shelf and is parallel to the shelf. Off Anadyr' Bay and the entrance to the Bering Strait the floating ice accumulates and becomes thick pack ice. The warm water current causes the ice to melt very early, however. By the middle of May it remains only along the Asiatic coast, /90/ and in June it still remains only at Anadyr' Bay. By July the Bering Sea is completely ice free, and the ice edge recedes back to the Polar Sea.

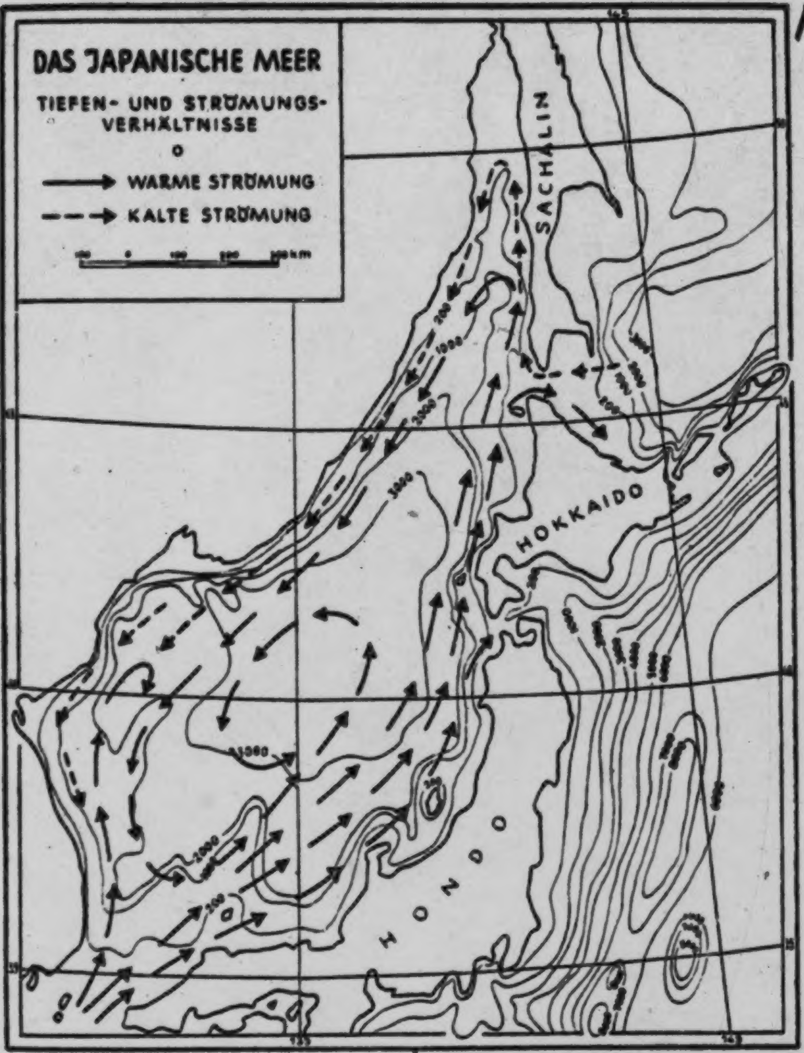
The Sea of Japan

The Sea of Japan stretches between the Asiatic continent to the west and the islands of Sakhalin, Hokkaido, and Hondo /Honshu/ to the east. It is connected with the East China Sea by way of the Korea Strait (depth: 167 meters), with the Pacific Ocean by the Straits of Tsugaru (106 meters) and Shimonoseki (30 meters), and with the Sea of Okhotsk by La Perouse Strait (55 meter) and the now blocked-off Tatar Strait (8-10 meters). In view of these relatively shallow connections to the neighboring sea areas, the Sea of Japan stamps itself as a clear sea basin, of which more than half is at a depth of 2,000 meters and approximately one quarter has a depth of 3,000 meters. The descent of the sea floor to a depth of 2,000 meters is far more abrupt from the Asiatic continent than from the east. After the Korean Strait in the south and the Tatar Strait to the north the sea floor rises gradually.

If the Sea of Japan presents its own sea basin, it also displays surface current conditions characteristic of a peripheral sea. The warm Kuroshio Current /Japan Current/, originating at tropical latitudes, flows from the south to contact the Sea of Japan at the Korea Strait. Designated by the Japanese as the Tsushima Current, this stream of warm water divides itself at the Korea Strait into two arms. The eastern, which is wider and flows more rapidly, flows in a northerly direction along the coastline of the Japanese islands, while the weaker western branch flows in a northerly direction somewhat parallel to the Korean coast. The latter soon comes up against cold waters due to a water current coming from the north along the coast. In part the waters mix; however, for the most part, the waters of the western branch of the Tsushima Current are pushed eastward from the coast, gradually turning east and then southeast, and they unite with the still relatively warm general stream of the former Tsushuma Current which is on its way back and which ends in a circular current moving counter-clockwise.

The warm mainstream of the Tsushima Current, which stretches northward along the coast of the Japanese islands, gradually loses its strength. Part of its current flows out through the Tsugaru Strait; a further part is later lost in the north through La Perouse Strait into the Sea of Okhotsk, while the remaining current presses further north in the direction of the Tatar Strait. Emerging from La Perouse Strait out into the Sea of Okhotsk, it now strikes a cold current. At first the warm current is able to deluge the cold current, and is able to advance as far as the southwest coast of Sakhalin where its tempering influence is still felt. But then it weakens at the coast /91 Sketch Map of the Sea of Japan:/ and is turned farther north. The shallow depths of the Tatar Strait act as a barrier and soon put a halt to any further northward movement, so that the relatively warm current turns west and then southwest, in which process it pulls cold water along, which, because of its higher salt content, can be identified as upwelling water /Auftriebwasser/. The cold water current runs along the coast until /92/ it reaches Korea. It reaches Vladivostok, where it contributes significantly to the tempering of the water and air temperatures there, and then it moves along the coast of Korea toward the south, where it encounters the above-mentioned western branch of the Tsushima

Sketch Map of the Sea of Japan:


DAS JAPANISCHE MEER
TIEFEN- UND STRÖMUNGS-VERHÄLTNISSE
WARME STRÖMUNG
KALTE STRÖMUNG
km
SACHALIN
HOKKAIDO
HONDO
200
1000
2000
3000

Depth and Current Conditions

⟶ warm current
- - -> cold current

133 Current and there finds its end. On the way, the cold water current is strengthened by upwelling water, which is noticeable along the coast of the Sikhote-Alin', especially south of Ol'ga Bay, and which is distinguished not only by its greater coolness but also by its higher salt content. Where the cold water current encounters the warm current, a cold water front forms which, however, does not always remain in the same place in the course of the year. In winter the cold current appears to attain a greater strength and moves the cold front to the south, while in summer the cold front again withdraws to the north. (116)

116. Lautensach, H., Korea, (Leipzig, 1945), p. 118.

132 Because of the fact that the Sea of Japan extends so far from
133 north to south--the Tatar Strait lies somewhat below the 50th latitude and the Korea Strait below the 35th latitude--the surface water temperatures in the various parts of the sea and in the course of the year are very different. In the area of the Korea Strait the surface water temperature varies between 26° and 14°, in the region of the Tsugaru Strait it varies between 24° and 5°, in La Perouse Strait it varies between 22° and 1.4°, and in the northern part of the Tatar Strait it varies between 17° and -2°.

The temperature of the water sinks very rapidly as the water gets deeper. In July, 1928, in the middle of the sea the temperature at the surface was 20.4°, at a depth of 50 meters it was still 3.4°, and at a depth of 100 meters it was only 0.8°. The last-mentioned temperature remains at depths of 500 meters and more. Nowhere, even at greater depths, has a lower temperature been determined. (205)

205. Suslov, S.P. Fizicheskaia geografiia SSSR /Physical Geography of the USSR/. Moscow-Leningrad, 1947.

133 In winter the Tatar Strait is regularly closed by a solid ice sheet to approximately 50° N. Otherwise such an ice covering is formed only in the bays of the Soviet Russian Maritime Krai; this applies, however, to bays as far as Vladivostok, whose harbor can be kept open during the three winter months only with the help of icebreakers. Floating ice, however, can be encountered regularly every winter in the northern part of the Sea of Japan as far as a line approximately from the middle of the island of Hokkaido to the Korea Bay.

/33 Tides are noticeable in all the Sea of Japan, but not in great measure. The tidal wave enters the Sea of Japan through the broad Korea Strait but then spreads so quickly that it is observed at practically the same time on all coasts. The range between high and low tide decreases the farther away one gets from the Korea Strait. Thus in Pusan it is still 2.10 meters, at the mouth of the Tumen it is only 0.30 meters, but it rises in the narrows of the Tatar Strait to as much as 2.70 meters.

/32 /33 The current conditions and the various water temperatures[1] affect the neighboring coastal regions in a remarkable fashion. On the mainland side the winters are under continental influence /93/ and bring a high degree of coldness. This applies especially to the Soviet Russian mainland coast and to Sakhalin. As a consequence the appearance of ice off the mainland coast extends farther to the south than it does in the eastern part of the Sea of Japan. Even in late spring the cold current brings in floating ice floes along the coast toward the south. In summer the cold coastal current along with the predominant east and southeast winds temper the air temperatures of the mainland coast. It is the source of the fog forming along the entire coast, especially during the summer; for the thickness and duration of the fog are greater in relation to the temperature contrast between the air and the surface of the water. This applies especially to the sea areas off the Soviet Russian coast, which with southeast winds predominanting are enveloped in thick, cool fogs.

/33 The salt content of the Sea of Japan is greatest in the south where water with a salt content of 34.56 percent enters through the Korea Strait; the salt content is smallest in the Tatar Strait, where it amounts to 31.96 percent. In winter the salt content of the surface water rises and can reach up to 35.0 percent. The reason for this can be found in the slightness of the winter rainfall and in the decreased inflow of fresh water from the rivers.

/32 A distinguishing mark of the Sea of Japan, important for sea transportation, is the frequent appearance of storms, which are especially numerous in spring and fall. They appear in the train of cyclones, which come from the mainland or the East China Sea and make use of the Sea of Japan as a route to the northeast. The number of these storms is not so great in the summer as in the transitional seasons, but they are of greater violence, especially in late summer when equatorial whirlwinds press into this region as typhoons and develop great wind velocities. In winter, on the other hand, the con-

[1] [i.e. in the Sea of Japan--Analyst]

132 tinental cold air front forces the paths of the cyclones toward the south and southeast, and accordingly their activity is limited more to Korea and the eastern part of the Sea of Japan and scarcely touches the Soviet areas.

The World of Plants

137 The vegetation, too, can be divided according to the climatic provinces. However, here the vegetation has not shaped special formations of its own, but rather has a general transitional character. In Transbaykal the Siberian taiga turns into the Mongolian steppe vegetation, and on the Amur and Ussuri typically Manchurian plants extend beyond these rivers and intermix with representatives of the Siberian evergreen woods. Only in the region of the coastal climate have some special forms of the plant world developed which are peculiar to this region alone.

/94/ In Transbaykal the steppe vegetation penetrates very far toward the north. Often it appears in islands in the middle of closed forest regions. In the valley of the Upper Angara we find feather grass (Stipa pennata) and fescue grass /Schafschwingel/ (Festuca ovina) as typical representatives on the southern slopes, while the northern slopes are covered with thick larch and pine forests. In the valley of the Barguzin feather grass and artemisia steppes are spread out not far from one another. Also the well-known Nerchinsk Steppe, better designated, however, as a forest steppe, is an island closed off in itself and approximately 100 kilometers long and just as wide. In general the character of a meadow steppe predominantes here, but in lower areas salt ground appears with numerous xerophilous plants. The steppe, however, attains its greatest area, here closed off, in the southeast between the upper courses of the Argun and of the Onon. This Argun Steppe begins in the north as a meadow steppe and turns toward the south into an artemisia steppe, which already gives the impression of being a semiwasteland. West of the Onon the pure steppe appears only in spots, and only in the Selenga area does it have a significant size. Here, between Novo-Selenginsk and Troitskosavsk /now: Kyakhta/ lie alluvial sands, which are often laid bare and which show an almost wasteland character with wandering dunes /Wanderdünen/ and inlaid Salzpfanne /salt pans/.

The ground relief is of decisive importance in determining the extent of the forms of vegetation in detail. The steppes as a rule remain in the valley areas at a height from 500 to 900 meters. Adjoining them are the forested steppes up to 1,200 meters, consisting predominantly of birches. Here thick forests with evergreen trees begin. In south Transbaykal the upper timber line lies at a height of 1,700 meters to 1,900 meters; in the raw north, however, it lies significantly lower. There the forest often ends already at 1,200 meters; but, on the other hand, it goes down farther, and on the northern slopes it penetrates to the banks of Lake Baykal.

The forests west of the Yablonovyy Ridge consist of the same types of trees as appear in all of east Siberia. The Daur larch /Daurische Lärche/ (Larix dahurica) is the principal tree. Associated with it is the Siberian cedar or Siberian stonepine (Pinus cembra), which in higher places even exceeds the larch. The Daur larch appears also with the pine (Pinus silvestris) on drier, sandy ground. The Siberian spruce (Picea obovata) and the Siberian fir (Abies sibirica), on the other hand, appear more rarely. The Siberian larch appears only in a small area west of the Selenga. How much the vegetation is influenced by the height of the land is shown by the 2,508-meter high Sokhondo just on the Mongolian border. Here the forests begin at a height of 1,200 meters and extend up to 1,900 meters, and consist of the same types of Siberian trees mentioned above. In one thing, however, the Transbaykal forests differ from the Siberian: in the thicker underbrush, which consists principally of rhododendron and bush birch /Strauchbirke/ (Betula Middendorffi).

/95/ Above the forest line a peculiar bent wood vegetation /Krummholzvegetation/ sets in, which is extremely characteristic not only of these high areas in Transbaykal but also of all the other regions. Principally represented here are the dwarf pine (Pinus pumila), the dwarf birch (Betula Middendorfii morphe alpina), the Cassiope (Cassiope ericoides), rhododendron (R. chrysanthum), and a dwarf form of the Daur larch (Larix Daurica var. pumila). This bush formation, which can be as high as 3 meters, is so overgrown and matted that it seems impossible to penetrate it.

An Alpine meadow region is lacking in Transbaykal. Mosses and lichens go from the bush vegetation as a rule right to the bare stone of the Gol'tsy.

East of the Yablonovyy Ridge the forests generally retain the same character as in the west; however, here the first deciduous trees appear as harbingers of the more temperate zones of east Asia: thus oaks, elms, and apple trees appear here. For the Russians, who missed

137 deciduous trees on the long way to the east from the Urals and who saw them again here for the first time, this sight may have been a true joy: accordingly they named the mountain ridge on which they first encountered wild apple trees, the Yablonovyy Khrebet, i.e., "Apple Mountain Range."

The forests of the real Far Eastern regions consist of three main elements: the east Siberian, the Okhotsk, and the Manchurian. The east Siberian element is represented by Daur larch. The Ayan spruce /Ajan-Fichte/ (Picea ajanensis), the stone birch /Steinbirke/ (Betyla ermani), and the fir with the white bark (Abies nephrolepis) are characteristic of the Okhotsk type of forest. This type of forest is limited to the damp-cool coastal region. In the basins of the middle Amur and of the Ussuri and in the southern Sikhote-Alin' we find the third type, the Manchurian, which is distinguished by a wealth of deciduous trees--oaks, maples, ashes, lindens, and others--and by an abundance of types of trees.

The mild climate of the Amur-Ussuri region already allows the broad-leafed deciduous trees to come into the foreground in the vegetation picture; indeed, in wide sections, these trees even attain predominance.

From the northern arc of the Amur, the east Siberian taiga entering here gradually changes its face toward the east, and becomes a mixed forest in which, at Blagoveshchensk, deciduous trees already outnumber the others. The oak (Quercus mongolica) should be mentioned as a characteristic tree, and soon lindens (Tilia amurensis and Tilia mandschurica) accompany it, as well as maples (Acer ginnala), and numerous other deciduous trees. Also a similar change takes place from the Stanovoy Ridge south to the Amur. The pine (Pinus silvestris), the most loyal tree of north Eurasia, which asserts itself from Europe to the Sea of Okhotsk, despite all differences in climate, finds its outer limit on the lower Amur. Likewise /96/ the Siberian spruce (Picea excelsa obovata), a variety of the European Picea excelsa, finds its extreme eastern limit here.

Characteristic of the deciduous forest areas of the Amur country is the Lespedeza (Lespedeza bicolor), which often covers all the ground in clearings or in burned-off areas. Although not as nourishing as lucerne /alfalfa/, it nevertheless constitutes an excellent food for livestock. On the Amur and especially in the Zeya-Bureya Plain there are extensive grass lands, which are also designated the "Amur Prairies." Near the rivers blue grass (Calamagrostis Langsdorffi) predominates. However, steppe elements also appear on these plains,--steppe animals as well as plants--for example the typical steppe grass Stipa capillata and the Nager Suslik (Citellus Eversmanni jacutensis). In swampy river valleys, especially on the Bureya, there are swamp forests consisting of poplars (Populus suaveolens), lindens (Tilia cordata amurensis), the Manchurian nut tree (Juglans mandschurica), and others. These flood forests are distinguished by an extraordinarily thick and peculiar underwood with numerous climbing plants. Of these, special mention should be made of the mighty Manchurian wine grape (Vitis amurensis) which grows in the Amur area as far as 51° North and as far as the Zeya on the west. The stem of this plant is up to 15 centimeters thick; its sweet black grapes are collected by the population and used to make wine or marmalade. 137

In the Ussuri country the vegetation puts on a completely Manchurian face. In contrast to the Siberian taiga which has only a few types of trees, here the extraordinary multiplicity of the plant world surprises the explorer. Komarov points to 64 types of trees, 79 types of bushes and 15 types of lianas here. It may be of great significance that these regions never experienceed an Ice Age, and accordingly representatives of Tertiary flora have been able to remain until today. In the Ussuri depression and in the valleys of the southern Sikhote-Alin' deciduous trees completely dominate the field. In the south, Korean and Japanese types of trees join with the Manchurian types. In addition to the deciduous trees already mentioned, the following can be mentioned as characteristic: the following types of maple--Acer barbinerve, Acer mono, Acer tegmentosum, Acer ukurunduense; the alders--Alnus fruticosa, Alnus japonica, Alnus incana; the pear trees--Pirus ussuriensis and Pirus sinensis; the mountain-ashes--Sorbus aucuparia, Sorbus sambucifolia; and the Amur elder, Syringa amurensis. Worthy of mention are the east Asiatic cork tree (Phellodendron amurensis), with its peculiarly soft bark, the white walnut (Aralia mandschurica), and the palm-like dimorphic plant (Dimorphantus mandschuricus).

In the higher regions of the Sikhote-Alin', on the other hand, coniferous trees again step into the foreground. The Daur larch appears everywhere. Appearing anew are the Manchurian cedar (Pinus mandschurica), which is concentrated more on the coasts, the spruce (Pinus funebris), and, on the east coast, the Olga larch (Larix Olgae). The 20-meter tall yew tree also /97/ appears occasionally (Taxus cuspidata). Junipers are to be found everywhere, and in higher regions they often cover whole areas with a creeping type of juniper (Juniperus

137 daurica). In the Sikhote-Alin' the three types of Far Eastern forests often meet in a tight area. The Manchurian element fills the valleys and slopes but never extends beyond 750 to 1,000 meters above sea level; following this element is the Okhotsk taiga, and following this in turn is the Siberian type with the Larix dahurica /Daur larch/. The heavy rainfall and the great warmth in the southern part of the Ussuri region give the water plants especially favorable opportunities to develop. Therefore there flourishes here also the lotus flower (Nelumbo speciosa), the Brasenia (Brasenia purpurea), which also spread into Europe in the Pre-Quarternary period, the water nut /Wassernuss/ (Trapa incisa), and in some places the water rose /Wasserrose/, Euryale fevox, whose great leaves attain a diameter of up to 130 centimeters.

In contrast to the Amur-Ussuri country, the vegetation of the coastal area shows a different, more sharply drawn picture. The hardy and perennial Daur larch, which penetrates to the Polar tree line in northeast Siberia and extends toward the south as far as into the Sikhote-Alin', avoids in a remarkable fashion the sea coast of the east with its damp and cool winds and appears first at some distance from the coast. The entire coastal country, therefore, is taken up by a special type of conifer forest, the Okhotsk taiga. There are mostly spruces, firs, and birches, which here grow thickly on the slopes to the sea coast. The typical trees are the types already mentioned: Ayan spruces, stone birches /Steinbirke/, firs with white bark. The Okhotsk taiga spreads along the coast of the sea by the same name, but it also takes in the area around the mouth of the Amur, and also dominates the part of the northern Sikhote-Alin' inclined toward the coast. It is, therefore, especially suited to the raw coastal climate. The mighty sea winds, however, do not permit a continuous extention of this taiga. Thus it covers above all the slopes and valleys, where it develops an extraordinarily thick growth which is difficult to penetrate. Toward the mountain ridges this taiga gives way very quickly to the usual bent wood /Krummholz/ vegetation, and adjoining this in turn is a moss and lichen formation, which covers the bulk of the ridges exposed to the winds and serves as an excellent summer meadow for the reindeer breeders. In the Dzhugdzhur almost all the passes which lead from the coast into the interior lie above the timber line, and this hampers their usefulness, especially in winter.

Kamchatka's vegetation picture corresponds generally to the Okhotsk type but it is changed somewhat by the milder climate and the relief. The stone birch /Steinbirke/ (Betula ermani) is the typical tree here, being completely dominant on all the slopes inclined toward the sea--both the Sea of Okhotsk and the Bering Sea; accordingly there is an overwhelming impression of a forest of deciduous trees. Only in the interior, where the continental climatic traits predominate, is the /98/ east Siberian taiga with the Daur larch preserved under the protection of the two mountain ridges. The higher mountains projecting beyond the tree line are again covered with a bent wood vegetation /Krummholzvegetation/, which is especially thick on Kamchatka and which often makes wide areas almost impenetrable. Along the west coast a tundra-like moss steppe has developed, which covers the northern part of the peninsula across from west to east. In contrast to the conditions which become more unfavorable toward the north, the vegetation increases toward the south both in abundance of growth and in types. Worthy of note is the appearance here of the Japanese birch (Betula japonica) and of numerous higher types of grass, such as Heracleum tanatum and Heracleum dulce, and the wide diffusion of the bear root /Bärenwurze[illegible]/ (Angelica ursina), which becomes up to three meters tall. The appearance of extended forest meadows in the southern part of the peninsula has also caused the introduction of cattle breeding. 137

The regions of the extreme northeast can generally be designated as tundra or forest tundra.

The World of Animals

Following the pattern of the natural vegetation set-up, the animal world has the same juxtaposition of the most varying forms. East Asiatic and Inner Asiatic types join with the Siberian types. In the land once famous for its wealth of wild animals, an unbelievably rapacious economy /Raubwirtschaft/ has either destroyed the useful wild animals or driven them into inaccessible regions. Nevertheless, the regions still little touched by man are extraordinarily great, and there the animals have been able to preserve themselves in all freedom and in great numbers. 136

Numerous rodents, which are especially characteristic of steppe regions, are native to the forest steppes and steppes of Transbaykal: for example, the "suslik," the ground squirrel (Citellus Eversmanni and Citellus dauricus); the "tarbagan," a type of woodchuck (Arctomys bobak), the earth hare or jumping hare /Erd- oder Springhase/ (Alactaga saltator mongolica), and others. Larger steppe animals, however, either are lacking or have been exterminated. The still untouched forest areas both in Transbaykal and in other regions, on the other hand, are very much richer in animals. Two real northern animals--the reindeer /Ren/ and the elk--live as far down as the northern Sikhote-Alin'. The reindeer is kept by the native Tungus as a domestic animal, but the wild reindeer can also still be found in large numbers in the north. The elk (Alces machlis) prefers swampy regions with deciduous forests and on its long wanderings penetrates as far south as 46° latitude. In contrast to its northern brother, the Ussuri elk does not have palmate antlers /Schaufeln/, but rather only stick-like antlers /Stangengeweih/, but it is just as big and primeval as the northern elk. The stag is hunted the most; the stags hunted here are the large "isiubr" (Cervus canadensis Luhdorfi) and the smaller spotted stag /Fleckenhirsch/ (Cervus Dybowskii). The latter, which belongs to the Sika stags /Sikahirschen/, is easily tamed and is therefore to be found in most European zoos. With /99/ the "isiubr" the Panten /spikes?/, the still unhardened antlers, are especially valuable and are exported to China as a folk medicine which brings good prices. Reckless hunting has driven the "isiubr" into the most remote regions. Both types of stag are bred on farms today. Widely diffused are the roe and, in mountain regions, the wild sheep, which appears in various types: Ovis ammon monglica in Transbaykal; Ovis jubata and Ovis Middendorffii on the Amur and Uda; Ovis storcki and Ovis alleni on the Sea of Okhotsk; and Ovis nivicola on Kamchatka. Beasts of prey are very numerous in the taiga. The animal characteristic of the taiga is the bear. He plays a big role in the mythology of the natives and is designated respectfully as "the lord." In addition to the usual brown bear, there is also a small black type and as well as the Tibetan white-breasted collar bear /Kragenbär/ (Ursus tibetanus), which is considered to be especially evil. In addition the following should be mentioned here: the wolf, the red wolf (Cuon alpinus), the glutton (Gulo luscus), the lynx, the wild cat (Felis euptilura), and various types of foxes. The red wolf is a jackal-like wild dog and as a rule is to be encountered wherever the wild sheep appears.

Various valuable fur animals are much hunted and therefore in many regions almost completely exterminated; examples of these are the sable (Martes Zibellina), the marten (Martes flavigula borealis), the ermine (Mustella erminis), the fish otter (Lutra vulgaris), the squirrel (Scurius vulgaris), and the rarer flying squirrel (Sciuropterus volans). Most of these animals have withdrawn to the remote parts

131

of the forest regions.

In the Ussuri region and in the Sikhote-Alin', because of the the southern location, still other animals worthy of mention appear in addition to the inhabitants of the forest regions already mentioned. Characteristic animals here are the Amur tiger (Felis tigris longipilis), the wild boar (Sus leucomystax continentalis), and the peculiar marten dog /Marderhund/, "enot," (Nyctereutes procynoides). The wild boars, for whom the oak forests provide excellent nourishment, dwell in great numbers, mostly in herds, in swampy regions with forests of deciduous trees or mixed forests. Following them is the tiger who is larger and has a more valuable fur than the Bengal king tiger /Königstiger/. He is, however, to be encountered only very rarely and only in mountain areas off from the beaten track. The marten dog is a dangerous beast of prey, who hunts roes and often even penetrates into the dwellings of men.

The world of birds is represented in large numbers. While tundra birds, such as the partridge (Lagopus mutus), nest on the mountains projecting beyond the tree line, in the Ussuri region we find numerous southern forms, such as the pelican, white heron, and the Cormorant. In the forests mountain cocks, black grouse, and numerous woodcocks are to be encountered, and in clearer regions partidges, quail, and also pheasants are found. The pheasants often migrate in large numbers from Manchuria into the Amur and Ussuri regions. Swans, wild geese, ducks, divers /Taucher/, and moor hens /100/ appear in very large numbers on all lakes and swamps. Khanka Lake is a real paradise for birds.

Amphibians and reptiles are to be encountered everywhere; they are especially numerous in the warmer Ussuri country. Among the snakes special mention should be made of the Natter Coluber Schrenckii, which becomes up to 1.5 meters long and 6 centimeters thick, and the especially poisonous Ancistrodon Blomhoffi.

The insect world should not go without mention. In the summer immense swarms of gnats develop which make life a real plague for both man and beast. Especially irritable are the stings of small stinging gnats, which the Russians designate generally as "gnus," i.e., vermin.

Of greater economic importance is the wealth of fish in all parts of the sea near the coasts. Every year great swarms of herring appear in the south, coming from the Sea of Japan. The area around the mouth of the Amur is distinguished by the regular appearance of

136 great schools of salmon, which come up the river to spawn. Most numerous are two types of salmon--the Keta salmon (Oncorhunchus Keta Walb.) and the humpback salmon called the gorbusha by the Russians. The Sea of Okhotsk has in addition herring, cod, tuna fish, and mackerel. The coastal area of Kamchatka have the riches supply of crabs in the world. On the eastern side of the peninsula it is principally Pacific types of salmon that are caught: the red salmon (Oncorhunchus nerka Walb.), the silver salmon (Oncorhunchus Kisutch Walb.), and the king salmon (Oncorhunchus tschawytscha Walb.). Originally the Bering Sea was extraordinarily rich in sea animals, expecially whales and seals, but these have been heavily decimated by man.

/101/ THE POPULATION

Prehistory and Colonization

171 Various discoveries of New Stone Age implements prove that
172 the Amur and Ussuri regions were already occupied by man at the turning point between Diluvium and Alluvium /the Diluvial and Alluvial Ages?/. Among the tools found are simple hatchets, chisels, spearheads, scrapers, and knives, hammered out of stone; but also known are polished tools such as those of the Neolithic Age in north Germany. Additional findings of an advanced, more recent Stone Age show string and ribbon pottery, similar to that of Europe's culture at the same time. (181)

181. A. Schultz, Das Ussuri-Land /The Ussuri Region/ (Königsberg, Prussia, 1932).

175 We derive our first historical information on these same regions from the old Chinese history books, which go back to 2500 B.C. According to these sources, in the land of the Amur and Ussuri there lived the Sushe in the east, the Huei (also called Hueimai) in the middle of Manchuria, and the Tonghu /Dunghu/ in the west. All three peoples, who were subdivided into numerous smaller tribes, are mentioned in the same areas even as late as the second century B.C. According to present-day research, the Sushe and the Huei are to be interpreted as Tungus, while the Tonghu /Dunghu/ are regarded as pre-Mongols. Discoveries of Stone Age culture of the latter people extend over all of eastern Mongolia. The Sushe and Huei lived predominantly in forested areas, while the Tonghu preferred the open plains. Thus, even

in the oldest periods the division into the forest peoples of the Tungus and the steppe people of the Mongols was apparent. /175

From their original home, which we must regard as northern Manchuria and the Ussuri region, the Tungus then spread over the larger part of eastern and central Siberia, and in the process they partly intermixed with the Paleoasiatic peoples living north of them and partly pushed these peoples farther and farther to the north and northeast. In this the Tungus tribes were able to adjust themselves with extraordinary adroitness to greatly varying types of terrain and to very different living conditions, and thus to extract from nature the best possible for their own culture. In the course of this development they divided into various branches so that today the Horse, Reindeer, and Dog Tungus can be differentiated according to culture. The largest part of the Tungus live today in the region of two eastern tributaries of the Yenisey, the Upper and the Lower Tunguska, which got their names from the Tungus; and live scattered widely /102/ over the entire far eastern region, with the exception of the extreme northeast, which remains preserved as the retreat area of the Paleoasiatics. The pressure of the Tungus to the north was also of use to the retreating peoples, for these peoples took over many cultural attainments from the Tungus. It can even be assumed that various Paleoasiatic peoples learned reindeer culture first from the Tungus.

Of the Paleoasiatic peoples only the Gilyak have retained their old habitat on the lower Amur and in the region of the Ude because of the protection of the swamps, just as the Ainu have remained on Sakhalin. The main section of the Paleoasiatics found refuge in the extreme northeast.

In the expansion of the Tungus over all of eastern Siberia many tribes dissolved into smaller tribes and groups. There was, of course, room enough for that. In their own homeland, however, cohesion was better preserved. In this region they had settled in large measure in the area left of the Amur; this applies especially to the Daur. Here, on the plains of the Zeya and Bureya, the Russians, as their first reports indicate, found a rather thickly-settled area occupied by a population which pursued agriculture and cattle raising. The Tungus peoples who were settled here left this land in the period after the rapacious intrusion of the Russians and withdrew to the quieter, right side of the Amur, or were later forcibly pushed there by the Russians, so that at present there are no Tungus settlers at all to be found in the real Amur country. The Amur as far as Khabarovsk

175 divides the Russians on the left side of the river from the Tungus and the Chinese on the other side. The Chinese had immigrated there later in large numbers.

172 In Transbaykal traces have been found which prove that man already occupied this country in the Paleolithic Age. Nevertheless these traces are very obscure and are still not interpreted. Much clearer information is given by the Neolithic findings of the life and economy of man there. At that time the land was occupied by sedentary fishermen and hunters, who in the south also did a slight amount of cattle raising. Their settlements lay primarily on rivers and lakes. For food they also collected edible plants, roots, mushrooms, berries, and "cedar nuts" (fruit of the Siberian stone pine). They already knew how to make clothes from hemp nettle fabrics.

175 The first historical information, according to Chinese sources, attests that in the third and second centuries B.C. this land was occupied by the Huns, who are described as semi-nomadic, and who pursued hunting and agriculture in addition to cattle raising. They were known through the trade which they conducted with the Chinese. Around 100 B.C. the land came under Chinese rule, though the borders are still very unclear. Other foreign rulers from the south replaced the Chinese, and so the land remained until about 900 A.D. with /103/ various peoples coming and going. Among these the Uigur are mentioned in particular. In the epoch of Chinggis /Genghis/ Khan, in the twelfth and thirteenth centuries, there lived here the Merkit, the Kereit, and Oirat, /Oirot/, among others, who are designated collectively as "forest peoples." They became involved in battles with the peoples of Chinggis /Genghis/ Khan, were defeated, and had to submit to his rule; this, however, was scarcely noticeable, since no consideration was given these rough wooded areas lying on the edge of this immense empire. At this time the Buryat tribes were formed from the various peoples, part of whom were seeking protection, and from the indigenous population Giving way to the pressure from the southern steppes, a part of these Buryat tribes withdrew to the western side of Lake Baykal. In so doing they pressed the Turkish Yakut and the Tungus peoples to the north. The Yakut withdrew to the region of the middle and lower Lena, a region composed in part of steppes, and pushed their residence up to as far as the Paleoasiatics residing in the north. Thus the Yakut pushed forward a broad wedge into the Tungus area of expansion.

In the fourteenth century the residence of the Buryat extended

from the Oka, a left tributary of the Angara, to the Onon and Argun 175
steppes in the east. At that time they already knew how to extract salt and to process iron. They were known as the trade middlemen between the Tungus hunting peoples and the Chinese. From the Tungus they acquired valuable furs (sable) by barter in exchange for food, especially millet, and these furs they exchanged with Chinese traders for silver and goods from China. In this period, under the leadership of the "Noyone," the tribal divisions had been transformed into fixed, almost state-like organizations, which were in a position to give successful resistance to the Cossacks pressing in in the seventeenth century. The first information which the Cossacks received of Transbaykal described the land as having a wealth of valuable furs and silver.

Even the Irkutsk Buryat accomplished vigorous resistance, and in many instances smaller Cossack divisions were defeated or annihiliated. In the course of battles lasting years the Cossacks succeeded in getting a foothold in Transbaykal in individual bases, which were built up into small fortresses. In 1646 Verkhne Angarsk was founded at the mouth of the Upper Angara on Lake Baykal, in 1648 Barguzin was founded, Nerchinsk in 1654, Selenginsk /now: Novo-Seleginsk/ in 1665, Verkhne Udinsk (Ulan-Ude) in 1666. Nevertheless the Buryat did not submit so easily to the will of the Cossacks, whose power did not extend far beyond the bases. Twice great uprisings broke out, and for months the bases were cut off from all contact and exposed to a severe siege. Smaller posts were pillaged, the personnel slaughtered, and the buildings destroyed. However, in the long run the Buryat could not hold out against the firearms and the better organization of the Russians. Many retreated into Mongolia, but from there they again and again /104/ made attacks. Only after the Treaty of Nerchinsk in 1639 did peace return to the land. With that colonization by the Russians began.

The Old Peoples

Three groups can be distinguished among the old peoples presently 101
occupying Transbaykal and the far eastern region: the Mongols, 144
the Tungus, and the Paleoasiatics. The Buryat are the sole representative of the Mongols in Baykal, while the Tungus and Paleoasiatic peoples are distributed over the entire far eastern region.

The Buryat occupy the region west and east of Lake Baykal.

3: Thiel--115 K-4,5 (no date) 1953 RR1 Siberia RR1

101 The Buryat occupy the region west and east of Lake Baykal.
563 Their entire number in 1939 was around 280,000. They are divided
into the Irkutsk and the Transbaykal Buryat. The former, numbering
approximately 100,000, live in the Irkutsk region and enjoy cultural
autonomy in the Ust'-Orda Krai. The Transbaykal Buryat are united
in the Buryat-Mongol ASSR. Nevertheless, they constitute only 43.8
percent of the population of this ASSR (1941), and the Russians are in
the majority. Buryat live in large numbers also in the Chita region,
especially in the Aginsk /Aga/ Steppe south of Chita, where they have
their own administration in a national district. The Buryat are regarded
as a branch of the Mongols and are contrasted with the Khalkha
563 Mongols in Outer Mongolia. As history shows, a part of this people
early became sedentary, especially west of Lake Baykal. In the
steppes of Transbaykal, however, the major part of the people remained
typical Mongolian nomads until the very recent past. Gmelin, who
traveled the land in the eighteenth century, reports that numerous
Buryat had herds of thousands of sheep and hundreds of reindeer and
horses. Georgi, who spent time in Transbaykal in the same century,
writes that individual Daur Buryat own up to 1,000 camel, 4,000
horses, 2,000 to 3,000 reindeer, 8,000 sheep, and hundreds of goats.
Even if these numbers may be exaggerated, they show nevertheless that
animal breeding was the basis of the economic life of the Buryat.
After the invasion of the Russians they were able to adjust in advantageous
fashion to the changed situation, and a large part of the people
went over to agriculture. There remained for them simply no other
way, since the Russian settlers took the best pasture lands from them
and transformed them into tilled land. Pressed into unfavorable areas,
they proceeded with remarkable energy and without European guidance
to create their own tilled land through artificial irrigation, especially
in the river region of the Selenga and in the Barguzin Valley. However,
in the southern steppes of Transbaykal they have /105/ retained
their original occupation, cattle raising, in which they have made
extraordinary accomplishments. The Buryat Republic belongs today
563 to the most important cattle surplus areas in the Soviet Union. Many
177 interesting features of their own folk life have been lost through the
introduction of kolkhoz economy and modern cattle-raising methods.
Thus the felt yurts occupied of old have simply disappeared and have been
replaced by small, practical wooden houses. However, there are still
regions in Transbaykal where the Buryat continue their nomadic life
unhindered, even though everywhere the influence of Russiandom
grows stronger and stronger. At most the Irkutsk Buryat and the

Lamut, Goldi

Transbaykal Buryat, who have gone over to agriculture and are living 563
among the Russians, are under this influence. Nevertheless their intelligence 177
and their self-consciousness, qualities which have always
been praised in them, create for them again and again a position of
their own, and expression is given to this in the autonomous soviet
republic and in the two national districts.

The Tungus or Evenki, as they are now named in Soviet 101
literature, are to be encountered in all of east Siberia. Their entire 563
number is estimated at 75,000. Of these the real Tungus, with about
30,000 people, live in an extended national district /okrug?/ west
of the Yakut ASSR on the right side of the Yenisey. The main part
of the remaining Tungus, who are divided into numerous small and
very small splinter peoples, live in the far eastern area. To them
belong the Lamut, Goldi, Olcha, Orok, Orochi, Orochon, and other
smaller tribes. The Lamut, whose name is taken from the Tungus
word "lamu," "the sea," live widely scattered over the entire Okhotsk
coast, the upper basin of the Anadyr', and are also represented on
Kamchatka. Their entire number undoubtedly cannot exceed 3,000.
Only a small part of them occupy themselves with reindeer breeding.
Most of them are sendentary and have fixed settlements at river mouths
on the sea, where they apply themselves to catching fish and in addition
are also active as hunters and dog breeders. The Lamut can be
designated as sea or coastal Tungus. Their ethnology has been studied
very little. Much better known are the Goldi. They live in the region
of the confluence of the Amur and Ussuri and are also scattered
in the valley of the Ussuri and in Sikhote-Alin'. They are settled
most thickly in the valley of the Amur below Khabarovsk. Among [142]
the Goldi the Mongolian racial marks are very strongly apparent: jaw
and cheek bones stand out, the nose is broad and low, hair is black
and straight. They used to make their clothing in part from fishskin, [291]
and it is for this reason that they were named "Yupi-tadsy," i.e.,
barbarians in fish clothing, by the Chinese. At present this national
costume of the Goldi has been completely displaced by clothing of
Russian or Chinese origin. The Goldi occupy themselves exclusively
with fishing, hunting, dog breeding, and trapping. A supply of fish [262]
is dried in the air for winter and serves then as nourishment for man
and dog. /106/ Usually the fish are cooked, but in the summer they
also eat them raw. They regard as delicacies raw marrow and the
liver of the isiubr stag. The wagon is unknown to the Goldi as a means [493]
of transportation. In summer they use a birch bark or board boat, and [501]
in the winter dog sleds.

Goldi, Olcha, Orochi

101
563 in the winter dog sleds. The position of the women is difficult.
[342] Polygamy is permitted. Bride purchase remains today. The Goldi live in small settlements of two to twenty houses, which are built out of mud like Chinese fang-tze /Fansen/. Many of them are half sunk in the earth. In the summer, however, the Goldi gladly leaves his fixed house and moves into his original domed tent, which is covered with birchbark or bast mats. In more recent times many Goldi have taken up the cultivation of vegetables, and they also breed pigs and chickens. The Samaghir, who live on the Gorin, a left tributary of the lower Amur, can be named as relatives of the Goldi. Their culture corresponds to that of the Goldi, but many expressions in their language indicate that they formerly were reindeer breeders. At present they devote themselves exclusively to fishing and hunting. Further downstream live the Olcha, who have also spread to the coast of the Tatar Strait and to Sakhalin. On Sakhalin they call themselves the Orok. The Olcha are also hunters, fishermen, and dog breeders. However, in contrast to the semi-nomadic Goldi, they are sedentary, and they all pursue agriculture in slight measure. Various signs indicate that they also were once reindeer breeders as their relatives, the Orok on Sakhalin, still are today. The total number of Olcha and Orok can scarcely exceed 2,000. More numerous--around 2,500--are the Orochi, who are also often called Udekhe (after the river Udekhe). Split up into numerous small groups, they live in the valleys of the middle and southern Sikhote-Alin' and also on the side toward the sea and the Ussuri. Many of
[177] them, especially in the south, are under Chinese influence and speak, reside, and live in a Chinese fashion. However, in the heart of Sikhote-Alin' they have remained rather pure and still live as true forest people, as Arseniev described them, and they show pronounced
[141] Tungus traits. The men on the average are 1.60 meters tall, and the women 1.45 meters. Their small hands and feet are striking.
[301] Like the Goldi they once wore ear and nose rings, and this custom still exists among the Orochi-Udekhe, although only among the
[342] women. They still live in pointed tents in contrast to the domed tents of the Goldi, in which the tent poles are bent together to form a dome and which recall, in their form, the yurts of the Mongols. On long trips, however, the Orochi did not take his tent along, since the tent was too burdensome for him; instead, while he was on his way, he built a simple protective tent out of twigs. The pure Orochi is only a hunter and fisherman. The social order of this people is

Orochi, Gilyak

The social order of this people is
peculiar. A council of elders and experienced /107/ people directs 101 563
the settlement. Everyone is free in his activity, but submits to the [621]
community. Every acquisition, every hunting bag is distributed not
only among the family but also through the entire settlement. Thus
families whose heads go on longer hunting trips and are often away
for weeks are taken care of. In the marriage customs there are remnants [583]
of group marriage. Faith and superstition are extraordinarily
strongly developed. They believe in various gods such as the forest [776]
god and the sea god, and they see all of nature animated by spirits.
The practical religion, however, is shamanism. The bear is the totem
animal. A bear's head is eaten ceremonially and communally in an
annual festival. A peculiarity is that a sick person is left when the [763]
first signs of death appear, and they return to him only when he is
dead. They also avoid the graves of the dead who are buried in the [769]
earth, and they also do not disturb the environs of the graves.

Of the other Tungus peoples there are still living in the Amur region a few Manchu, Daur, and Solon, who immigrated from Manchuria. In Transbaykal there is still to be mentioned the Orochon, who live in the taiga of the Chita region and are hunters primarily. Reindeer breeding is of less importance among them.

Of the Paleoasiatics only the Gilyak remain in the Amur region and the Ainu on Sakhalin. The main part live in the extreme northeast and consist of Chukchee, Koryak, and Kamchadal, and in addition to these still another group, consisting of Eskimo and Aleut, should be mentioned.

The Gilyak live on the lower Amur and on the coast north and
south of the Amur's mouth. Their number is estimated at approximately
2,000. In external features they approach the type of the Tungus- [197]
Manchu peoples, but their language deviates completely from the
dialects of the Tungus-Manchu peoples, and even from the dialects of
the other Paleoasiatic peoples, and recalls the idioms of individual
Indian tribes of Northwest America. Dog, seal, and fish skins, in [281]
particular, are used for the manufacture of clothing. Their main occupation
is fishing and hunting sea animals. However, in the winter
they also hunt bears and sables. They always build their dwellings on 101
rivers or near the coast, and they always have a summer and a winter 563
house, which are often right next to one another. Even in the last 342
century they used in winter a "subterranean yurt," as Schrenck named
it, an earthen cave, such as was customary among the Koryak and
Kamchadal until a few decades ago. One can conclude from this that

Gilyak, Chukchee

101 earth dwellings must have been the original winter dwelling of the
563 Paleoasiatics. Even today the Gilyak on the northern coast of Sakhalin
[342] live in such earthen caves. The Gilyak on the Amur live at present
in primitively built Chinese mud huts. The summer dwelling consists
of a tent built on poles partly for protection against floods and further
for reasons of better /108/ ventilation. This type of pile dwelling is
[171] not to be encountered among any Tungus people; it, however, still
exists today among the Kamchadal, who are likewise a Paleoasiatic
people. The sole domestic animal is the dog. The Gilyak dog sled,
[493] the narta, is built out of birchwood and is very light. The dogs are
not harnessed in pairs but individually, and they don't pull with their
[262] chest but with their neck. The main food of the Gilyak is fish dried
in the air, which they name "ma." Today they also use the same
word for bread. They like very much to eat dog and bear meat too.
[441] A few decades ago they still were using only bows, arrows, and lances
for hunting. Even today they wear on the right index finger--now, of
course, as decoration--a metal ring, which formerly served to pro-
[583] tect the finger from the stretching of the bow. Group marriage was
still customary among the Gilyak in 1905. In their spiritual life,
[776] worship of the bear plays a large role: this is a common mark of all
Paleoasiatic peoples. Worship of the bear is also practised among the
Tungus, but not so markedly; and even among the Russian occupants
of the taiga this custom has not remained without influence. Of the
Ainu only a part live on Sakhalin; the great majority live on the north-
ern Japanese islands.

The Paleoasiatics in the northeast fall into two groups. The western group consists of the Chukchee, Koryak, and Kamchadal, who are closely related to one another; the eastern group consists of the Asiatic Eskimo and the Aleut. When the Russians first encountered the Paleoasiatic peoples here in the far north, they were still in part on the cultural level of the Stone Age and used stone hachets, stone knives, and weapons with bone points. Even today they show many ancient traits.

The Chukchee or Luoravetlan occupy the peninsula named
after them. Some of them are settled on seacoasts and pursue fishing
and the hunting of sea animals; some, living as reindeer nomads,
[342] traverse the tundra-covered peninsula. A large pointed tent with a
round base serves as a dwelling for both groups. It consists of poles
placed together and covered with reindeer skins or walrus hides; on
the outside down below they are weighted down with stones. The

Chukchee, Koryak

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material life of the Maritime Chukchee, who number approximately 3,000, is completely the same as that of the Eskimo. They use the same leather boat, the kayak, and the metal harpoon with a float made of an inflated sealskin, and many other things. On the other hand the Reindeer Chuckchee are completely nomadic and have shown themselves to be extraordinarily good reindeer breeders. They number only about 9,000, but they have around half a million reindeer. But still reindeer breeding does not appear to have been their original sphere, for many idioms as well as marks of their dwelling indicate that they also once lived on the banks of the sea; reindeer breeding was perhaps taken over later from the neighboring Tungus. Thus, /109/ as Bogoras (37) reports, the interior of the sleeping section of the tent is designated as the "skin of the white bear" by the Reindeer Chukchee, even though at present not bear skin but rather only reindeer skin serves as walls and bed covering both for the Reindeer and the Maritime Chukchee. Peculiar is the belief of the Chukchee that a life after death is attained only by a person who has had a violent death, and it was not long ago that, out of a kind of sympathy, they killed their own people who were weakened by age or unfit for life; this custom is also reported among the North American Eskimo. The Chukchee, Koryak, and Kamchadal generally show many traits related to those of the Indians of northwest America, and it is for this reason that Bogoras classifies as "Americanoid" the entire group of Paleoasiatics, including the Gilyak mentioned earlier.[1] Myths and sagas coincide both in content and in form, often down to details, with those of the northwest American Indians. Accordingly the assumption should not be dismissed that the Chukchee, Koryak, and Kamchadal once were immediate neighbors of the Indians, and that only at a later time did the Eskimo shove in between them.

[501] [174] [761] [171]

The Koryak, now also designated as Nymylan, occupy the northern half of Kamchatka and the adjacent continent. Their number is estimated at around 10,000. Like the Chukchee they are divided in half into the Maritime Koryak and the Reindeer Koryak. The former are sedentary and above all fishermen, and their life approaches in significant measure that of the Eskimo. They also hunt sea animals such as the walrus, the seal, and occasionally also the whale. They are already extensively absorbed into the Russian culture and live

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37. V. Bogoras. The Chukchee (New York, 1904/1908).

[1] [cf. cat.116, pp.118-119 -- Analyst]

Koryak, Kamchadal

101 563 together in villages in crudely constructed wooden houses. The leather
boats, which they still use for hunting and fishing, are disappearing
more and more. The Reindeer Koryak have also already grown far
from their original culture. They are primarily reindeer breeders and
own large herds. They live nomadic life wandering between the valley
regions protected from the wind in the winter and the gnat-free mount-
[342] ainous tundra in the summer. The square winter hut, which is built
from wood and is half sunk in the earth, is built in imitation of the
Russian house. They recall the old pit dwelling of Europe. Only in
the summer do they use their round, transportable tent, which in its
original form consisted of a framework of poles covered with reindeer
skins. Today, however, it is often only a type of board shanty, since
their wanderings are mostly limited to short stretches. The winter huts
as a rule lie on rivers and are permanent constructions. Older people
often remain in the winter huts even in the summer, and accordingly
[142] the Koryak must be designated as semi-nomadic. Physically the Koryak
are medium to short in height with straight black hair, slight growth
of hair on the face, and brown-bronze skin color. They make their
[281] clothes out of reindeer, wolf and dog skins, and they make lighter
clothing for the summer from seal skin. In this /110/ they show a
color-happy feeling for art and decorate their clothing with strips of
hide of different colors or with leather which they form into various
ornaments.

The Kamchadal or Itelmen occupy the southern part of Kamchatka
Peninsula, primarily the southern part of the western coast and the
Kamchatka valley. Their number earlier must have been much greater,
for old reports speak of tens of thousands. Today their number can
[177] scarcely be determined since a very large part of the people have been
completely Russianized. Many have almost forgotten their own language.
It is interesting that numerous Russians in the first wave of colonizers
are completely absorbed in the Kamchadal and cannot be distinguished
from them at all in mode of living and customs. In some villages on
the western coast between Zedanka and Zepochnoye there are still pure
Kamchadal, who number around 800 (1930). Often these people alone
are designated as Itelmen and contrasted to the Kamchadal. They
[342] have abandoned their original earth hut, which can still be encountered
in the interior as a base for hunters, and they live in clumsy wooden
houses of the Russian type. Fishing is their principal occupation. In
the winter, however, they move into the mountains to hunt fur animals.
Their houses stand unordered in loose groups on the rivers. When the

Kamchadal, Eskimo

when the salmon run begins, festivals of joy and work begin for young and old. 101 563
As a rule the fish are caught in fixed traps, which are drawn across [226]
the river so that the way is barred for the fish as they go upstream.
The fish press together in great masses in front of this weir and are
caught with simple scoop nets. The common drying place is never [251]
empty, for it is important to preserve as many fish as possible for the
entire year by drying them. In addition, an older method is still used
occasionally: the fish are buried in the earth and there becomes sour;
hence there is a kind of fish silo from which fish can be fetched during
the winter as needed. A penetrating fish smell fills the entire settlement,
and there is no end to eating during the catching season. It
is not too much to say that the Kamchadal live on fish and tea. The [231]
dog, the most important domestic animal and beast of burden for all
sedentary native northeast Siberians, is also fed on fish. The number
of dogs is considered as the mark of wealth. There are families
which have 200 to 300 dogs, which are housed in a pen near the house
and fill the entire region with their hoarse barking. It is inadvisable
for strangers to go near these half-wild animals. At present the horse
is spreading more and more and is beginning to displace the dog as
the beast of burden. Through the state organization of fishing and the
introduction of modern methods, large sections of the Koryak have
also been incorporated and placed in a new order. Many have also
turned to agriculture and cattle-breeding.

/111/ The Asiatic Eskimo live on the banks of Bering Strait
and occupy 17 villages with approximately 1,600 people. They extended [174]
much further formerly; and it is for this reason that there are
Eskimo names for places now occupied by Maritime Chukchee. The
displacement of the Eskimo must have been done simply by force, for
the sagas of the Chukchee are filled with reports of hard battles with
the Eskimo, battles which, however, ended long before the entrance
of the Russians. Today the two peoples live harmoniously beside one
another in separate villages. The Asiatic Eskimo differ from their
relatives in Alaska in their speech but culturally they form a unit with
them. With their life completely directed toward the sea, they seldom
go into the interior of the land; for such occasions they use dog sleds.
On the Commander Islands live approximately 500 Aleut, who, according
to their language, are related to the Eskimo. They, too,
live completely from catching sea animals, since the islands offer
them only birds.

As has already been said, the Buryat Mongols have a cultural

563 As has already been said,[1] the Buryat Mongols have a cultural
517 administration of their own in the Autonomous Soviet Republic named after them and in the national districts already listed. Using the Russian alphabet, they have created their own writing. Elementary schools have permeated the entire land, and there are also higher schools in the cities; hence, according to Soviet claims, illiteracy has been almost completely eliminated. Newspapers appear in the Buryat language, and in Ulan-Ude even a Buryat-Mongolian theater has been brought to life. Numerous cultural institutions provide political enlightenment. Like all autonomous regions in the USSR, the Buryat Mongol ASSR has, as it is called in Soviet literature, a culture which is national in form and Socialist in content. This goal is also strived for with the other old peoples. In the national districts such as the Chukchee (capital Anadyr') and the Koryak (capital Palma) have, so-called "Kultbazen" (culture bases) play an important role in this connection. Since continuous measures for influence and
[658] education are not possible with areas so large and populations so widely scattered over these areas, there have been created for this purpose culture bases which are visited on occasion by the natives. How life in such a culture center can be envisaged is described by Nicholas Mikhailov (Land of the Soviets, New York 1939, p. 187): "When a hunter or reindeer breeder enters a culture base, he is provided with food, and a bed is placed at his disposal. He is led into the museum, and the natural bases and the economy of his region is illustrated to him. He is shown the workshops, and, if necessary, his gun, his sled, or his clothing are repaired. He learns now to rear animals, to remove their hides and to prepare the hides, how to preserve fish and how to take care of sick reindeer. /112/ A doctor examines the hunter in a clinic and treats him as necessary. The new arrival takes a bath, attends the movie, and listens to the radio."

563 Apart from the Buryat, who have self-consciously taken their own fate into their hands, and the Chukchee and Koryak, who stand out above all others because of their important reindeer breeding and who can lead their own life apart from the rest of the world, all the other small peoples and remains of peoples are without significance for the development of the land, however interesting their ethnological remains are. Their existence in the broad wastes of their residential areas is limited to very primitive self-sufficiency or to the exchange of their products for other basic needs. Thus it was left to the Russians, not only to develop the land but also to bring it closer to the great economy and the world.

[1] [cf. cat. 563, p. 115 -- Analyst]

3: Thiel--124 K-4,5 (no date) 1953 RR1 Siberia RR1

The Russians

563 The original Cossack settlements formed the basis of the Russian
167 colonization. According to the treaties of Aigun and Peking, the
361 Amur and Ussuri Cossack formations were put next to the Transbaykal
Cossack army assigned to the Argun. In the period from 1858 to 1862, 23 such Cossack settlements with 5,000 people came into being on the Ussuri and 75 on the Amur. These Cossack outposts consisted of loosely laid-out villages and also of individual settlements, which were organized in a military fashion for the protection of the border, but which in addition had to maintain themselves economically. For this there was distributed to them large landed property which extended along the Argun, the Amur, the Ussuri and the Suifun along the Chinese border. Successive settlers attached themselves to these strips of settlements, made them more densely populated or extended them. Thus there came into existence, on the one hand, the remarkably long strips of settlements along the border rivers, settlements which extended into the hinterland only where favorable conditions allowed new land to be developed without much work; and, on the other hand, there came into existence among the settlers themselves a certain organization which can be observed in typical characteristics even in recent times. Near the borders on the better land near the rivers sit the old settlers with large pieces of property; mostly these old settlers are descendants of the Cossacks who, after years of fighting, deprivations, and also successes, became enterprising culture pioneers who did not shy from risks, and who represent a powerful, hard, self-conscious race of people. On the other hand, to the side in the interior, mostly on land of slight value, live the the new settlers who came later; they have preserved all the typical characteristics of the East European Russian with his strengths and weaknesses.

563 Despite various laws favoring emigration of Russian citizens--
167 the first law in this connection was enacted in 1861--/113/ and despite
162 many facilities and much fostering, colonization proceeded only very
slowly in the first decades. All recruiting measures had only slight success. The difficult, long land route through Siberia and also the long sea trip frightened many off. Only with the building of the Transsiberian Railway did a stronger stream of immigration begin, and the population east of Lake Baykal was already 1,622,000 by 1911; of these 1,225,000 were Russians and around 20,000 were other Europeans. Of the remaining population of 379,000, the greater part were Buryat, who numbered 205,000, and the remainder was divided between

563 167 162 Chinese, Koreans, and numerous small indigenous peoples. The disorders of the revolution after World War I brought many Russians to the Far East. Planned measures for colonization instituted by the Soviet government contributed to this, and by 1926 the population east of Lake Baykal reached around 2.3 million and had risen to 4,040,000 persons by the time of the last census on January 17, 1939. The increase consisted principally of Russians. By 1939 in the Buryat Mongolian ASSR the Russians had an absolute majority with 52.7 percent (in 1941, 57.2 percent) of the entire population of 542,000. In the Chita region, with a total population of 1,159,500, the number of Buryat and other natives can be estimated at most at 50,000, and in the Khabarovsk and coastal region, with a total of 2,338,100 inhabitants, the percentage of indigenous peoples is only 3 percent.

The main part of the Russians are occupied with agriculture and cattle breeding. In addition, fishing and hunting serve as an additional occupation. The professional Russian hunter, the "Promyshlennik," a real runner type, still hasn't died out. The number working in industry has increased sharply in recent years.

563 361 342 Even here the Russian peasant continues the life he used to lead at home, and he troubles himself here no less than he did there. Accordingly one can often recognize in the type of settlement where the settler came from, even if it was decades and more ago. The Great Russians, especially those from the northern regions, prefer residences on rivers and in wooded areas. Their houses are built in the same block house style of the "izba" they used to live in. Hunting and fishing are very popular with them. The White Russians also prefer wooded areas. The Ukrainians, on the other hand, are mostly better farmers; they are to be encountered in especially large numbers in the Khanka Lake area, which is relatively free of woods, and around Bochkarevo /now: Kuybyshevka/, and they are descended in large measure from Cossacks who had been sent from the Don area. Their houses show the same whitewashed mud walls and are covered with straw like their "khata" in the Ukraine, although there is really no shortage of wood. Although there are often rivers flowing nearby, they dig a well near the house as a rule because well water, as they say, is cooler and more tasty. Woods in /114/ the vicinity of Ukrainian settlements soon are destroyed; the Ukrainian uses not only the axe but also fire against the woods. The Ukrainians are especially successful with cattle raising.

The cities, too, show the usual Russian face. In the center of the larger cities there are, in addition to narrow tenement houses, some pompous, mostly very tasteless buildings of the Czarist period. But in the suburbs one-story log houses with four or more windows often line the unpaved streets with wooden sidewalks for kilometers. In the period of the Soviet regime the large cities have acquired entirely new sections which are transected with asphalt streets lined with trees, and on these streets rise light, detached apartment buildings, often with four or more stories; these apartment buildings seem almost like skyscrapers against the otherwise flat picture of the city. Chimneys and thick, reinforced concrete buildings of the factories, which today are most striking, rise above the new buildings as a rule. Thus in the cities there are the contrasts ranging from the old, primitive, peasant-like suburb to the most modern industrial establishments. Nevertheless, almost nowhere does one note that he is in the Far East. Even in the Chinese quarter of Vladivostock there stand the same whitewashed tenement houses, and only the Chinese writing and the nearby junk harbor betray the fact that one is in an east Asiatic harbor city. 563 361 342

The state-directed economy with its tight compression into cities and collectivization in the country has introduced many new traits in the life and work of the people, and many old, proved things have been destroyed. It has mixed people up and done many new things, so that everything is in the process of fermenting, of being reformed even in the folk life of the Russians. 178

Chinese, Koreans, and Others

In Transbaykal Chinese are encountered very rarely. They used to be there in larger numbers as traders in Maimache, the present Altin-Bulag, opposite Kyakhta on the Mongolian border, but they were driven from there during the uprising of the Mongols after the first world war. 563

The first Chinese came to the Amur and Ussuri country as ginseng-seekers, as "panten"/unhardened antlers/ hunters, and as traders, and later also as settlers. As culture pioneers they were valuable everywhere in the wilderness where they could practise agriculture, which they pursued industriously and successfully. Their ability to make capital out of everything, however, soon made them into unscrupulous exploiters of the natives, and, accordingly they were unwanted guests under the Russian administration, especially since they carried their rich earnings out of the country, then /115/, as a sworn community in trade, they suppressed all competition. They

563 also engaged in smuggling gold. In 1900 it came to a catastrophe
when the Russian authorities drove all Chinese over the border. At
Blagoveshchensk nearly 5,000 perished who were chased with force
into the Amur. The building of cities and industry, however, drew
them again and again into the country as workers, and many of these
remained in the country as settlers or also as frugal artisans. Culturally
they have had a very strong influence on the natives, who, like the
[177] Udekhe in southern Sikhote-Alin', have not only taken over the
material life of the Chinese but have even given up their language
in favor of that of the Chinese. Chinese clothing and the Chinese
houses have asserted themselves as far as the Gilyak on the lower
Amur and stand everywhere in competition with Russian influence,
[342] which gradually has asserted itself. The Chinese house, the 'fanse,'
has mud walls. Its gabled roof is covered with straw. Almost the
entire front side is taken up by large windows, pasted over with oil-paper
and covered with bars; these windows can be slid out and removed.
On the sides and along the back wall there are no windows.
[354] In the interior of the 'fanse' a small stove with an iron boiler lies on
each side of the door. Smoke ducts lead from these two stoves under
[352] the sleeping places which built from stone and mud, extend along
the walls and fill nearly half the room. This type of plank bed,
designated a "kang," is approximately 0.50 meters high. From these
the smoke ducts then lead to the chimney, which is likewise made of
stone and mud. Because of the danger of fire, the chimney always
stands alone and somewhat away from the house. It is not uncommon
[351] for the 'kang' to have its own heating also. The farm buildings are
usually attached to the house at right angles, and the square courtyard
thus formed is closed off behind by a wall or a fence. The Chinese
also like to mark off a rectangular area in front of the house, or to
surround their entire lodging with a wall which is often very thick;
the natives, however, mostly are satisfied with the house alone, which
is often only a wretched, dirty mud hut, whatever the layout.

[162] Of the 87,999 Chinese who lived in Siberia in 1939, approximately
half live in the southern Ussuri region; the remainder are mostly
scattered in the cities. The number of women among the Chinese is
very slight and amounts to only 6 percent. In the southern Ussuri region,
therefore, the number of Chinese-Udekhe half-breeds is large;
they are generally designated "tas."

The Korean element in the population is entirely different.
Some old villages in the Pos'yet area have existed since time im-

memorial. The immigration of additional Koreans, however, began 563
only after the Treaty of Peking, and in this immigration the southern region was their preferred goal. These Koreans always came with their wives and families, and the majority of them were /116/ farmers. They are a valuable part of the population and show especial skill in growing Manchurian plants such as millet, beans, and rice. In addition, they keep cattle as work animals and pigs. They have succeeded in extending the cultivation of rice to the north as far as the Khabarovsk region. Of the approximately 170,000 Koreans (1939) who live in the [162]
Soviet Union, around 100,000 reside in the Ussuri region. A part of the remaining Koreans have been resettled in Turkestan where they live as rice planters on the Syr Dar'ya and the Iliysk.

A few thousand Japanese resided in the coastal cities up until 563
World War I, but since then the number has constantly decreased and 162
amounts now to a few hundred at most.

Worthy of mention as a special group are the Jews, who have their own autonomous region west of Khabarovsk on both sides of the right tributaries of the Amur, the Bira and the Bidzhan. Of the entire population, which number 108,400 (1939), approximately half are Jews, who engage in all vocations and who not only come from the Soviet Union but also from other countries.

In addition there are, scattered over the entire region east of Lake Baykal, Poles, Lithuanians, Latvians, Moldavians, Tatar, and others, including Germans; in short there are representatives of all peoples who reside in the Soviet Union. Their total number may be estimated at approximately 20,000 to 30,000.

Distribution, Development, Structure

With the overwhelming vastness of the area and the extra- 361
ordinarily uneven distribution of the population, figures on the density 161
of population have scarcely any meaning. The main part of the population, comprising about 90 percent, cluster together in a long, extended zone of settlements, which begins at Lake Baykal and stretches along the Amur and Ussuri to Vladivostok. The zone, which is otherwise narrow, attains a greater width in some areas.

In Transbaykal only the river areas of the Selenga and of the Amur are thickly settled, while in between in the area of the Yablonovyy Ridge there is a certain thinning out of the settlements. The valley region of the Selenga, which is occupied primarily by Buryat, attains in some counties a density of 15-20 persons per square kilometer. East of the Yablonovyy Ridge, between Chita and the Argun, there is a second densely populated zone, where the density reaches up to 20 persons per square kilometer in the agricultural area of black earth. The larger northern part of Transbaykal, however, is only very lightly settled, and the wooded wastelands of the plateau area of the Vitim are for all practical purposes not settled at all. Only gold mining has given rise to settlements scattered here and there like dots.

In the Amur area the river itself and the railroad stand out as the guiding lines of the settlement. The narrow area between the two, however, /117/ is not always occupied throughout. In the Zeya-Bureya plain the civilized area then enlarges into an extensive, closed-off plain of settlements; in this plain the landed estates of the former Cossacks lie on the Amur; adjacent to them in a broad band are the cultivated fields of the old settlers, while the new settlers are distributed more on the outer rim. In the Zeya-Bureya plain lies 80 percent of all the cultivated area in the Amur region. In some sections the density of population here, too, reaches 20 persons per square kilometer. East of the Bureya a strip of settlements stretches along the railroad, while a second follows the Amur. In the Khabarovsk area the two meet. From there the thickly-settled zone winds along the Ussuri to the south. After the Iman, a tributary of the Ussuri, the zone stretches out to a width of up to 250 kilometers and so reaches Vladivostok. In this region between Iman and Vladivostok lies approximately 75 percent of the cultivated area of the coastal region.

On the lower Amur there is no extensive area of settlement. Here the population is concentrated in the two cities of Komsomol'sk and Nikolayevsk and in individual villages which lie along the river's course, just as individual village settlements outside of the settled zones described are generally to be found only along the courses of rivers. Even in 1952 there were only 30 kolkhoz in the region of the lower Amur. On the coast of the Ussuri region there are relatively few colonies. The southern part of this coast is somewhat better settled, since the coast is more open and the treasures of the soil existing abundantly there create opportunities for employment for a larger population. The Ol'ga Bay and its hinterland should be mentioned here especially as being heavily settled.

The interior of Sikhote-Alin' like entire distant north of the Far Eastern area as far as the Chukchi Peninsula is extraordinarily thinly settled. Here the density of population sinks to 0.1 per square kilometer and lower. Here primarily are indigenous peoples, who wander through the vast, immense land as reindeer breeders and hunters. The sources of food in the sea, however, have also lured many people to the coast, on which, at greater or smaller distances from one another, there can be found again and again fishing settlements inhabited by natives, often intermixed with Russians. In recent times fishing kolkhoz have been founded according to plan in all the favorable places, and they have been occupied by Russians. The most important places are at the same time starting points for land routes into the interior; this applies to Ayan, Okhotsk, Magadan, and Gizhiga on the Okhotsk coast. Kamchatka has increased its population greatly in recent years because of the great rise in fishing and hunting of sea animals. In 1950 the total population was approximately 130,000, which was five times as much as it was in 1926. However, the main stream of immigrants came here, too, to the coastal places, especially Petropavlovsk, Ust'-Kamchatsk, and Bol'sheretsk. Despite the important growth in population, the density of population in Kamchatka has scarcely reached 1 person per square kilometer.

/118/ Sakhalin, too, like Kamchatka has had a large immigration. However, here the immigration is explained above all by the development of the petroleum, coal, and fish industries, all of which are located near the coast; accordingly the population is compressed into these areas, while the uneconomic interior is in large measure uninhabited. Only in the valley of the central depression are agricultural settlements encountered. Southern Sakhalin, which was Japanese until 1945, also shows somewhat the same picture in the distribution of its population. The number of inhabitants exceeds that of northern Sakhalin, but here, too, the population is compressed into the coastal area, whereas the interior, as in northern Sakhalin, is occupied for the most part only by small groups of old peoples such as the Olcha, the Oroki, the Gilyak, and the Ainu. In southern Sakhalin there were in 1940 still 1,500 Ainu, who in numbers rank above the other old peoples. The number of the other remnant peoples scarcely reaches 500. The evacuation of the Japanese has given the Soviet [166] Union the task of filling the land with its own people, and, according to all information available, they have succeeded in this. In the process other people have moved in to the former Japanese settlements, but the spatial distribution remains the same. The numerical changes in the population will be discussed later.

The data of the censuses from 1926 to 1939 are available for

161 The data of the censuses from 1926 to 1939 are available for observing the general development of the population. According to 167 these the number of inhabitants in the area east of Lake Baykal has increased from 2.3 million to 4,039,800 inhabitants, i.e. 75 percent. By comparing this with the average increase in population in the Soviet Union, which amounted to 15.9 percent during this period and which can be considered equivalent to the natural increase in the population, it can be deduced that in the eastern region the growth through immigration reached the considerable height of 59.1 percent. The individual areas, however, participate very differently in this increase. The increase in the Buryat Mongolian ASSR reached only 39 percent, but that in the Chita area was 73 percent, and in the Khabarovsk area it was even 136 percent. Since resettlement in the Soviet Union is directed by the state, a tendency is shown here to give preferred treatment to the area farthest from European Russia. The coastal district, however, appears to be an exception, for its population increased only 42 percent during this period.

Development of the Population

	1926	1939	Increase in percent	Increase through immigration in percent
Buryat Mongol ASSR	390,000	542,200	39	23.1
Chita Region	670,000	1,159,500	73	57.1
Khabarovsk Region	606,000	1,430,900	136	120.1
Coastal District	638,000	907,200	42	26.1
Total	2,304,000	4,039,800	57.5	59.1

162 /119/ During the same period between 1926 and 1939 a basic change in the structure of the population took place because of the extraordinary increase in the urban part. While the urban part of the population in the Far Eastern region amounted to only 24 percent in 1926, by 1939 it had increased almost to 50 percent. Since Soviet statistics make the concept of urban population equivalent to that of non-agrarian population, a general division by vocation can be deduced from these figures. The Buryat Mongol ASSR has remained predominantly agrarian. The urban share is only 30 percent and even lies below the average for the Soviet Union, which is 32.8 percent. In the three other areas this mean is exceeded and amounts to 44 percent in the Chita region, 45 percent in the Khabarovsk region and even

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51 percent in the coastal district. The increase in the urban section of the population indicates that immigration which formerly served predominantly to foster agrarian colonization, now serves the industrial build-up more.

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The increase in the urban population is made graphic in the growth of cities. In 1939 there was a total of seven cities with more than 50,000 inhabitants; except for Blagoveshchensk, they all increased in size, as follows:

	1926	1939	Increase or decrease in percent
Ulan-Ude	29,918	129,417	+ 347.5
Chita	61,526	102,555	+ 56.7 /sic/
Blagoveshchensk	61,205	58,761	- 4.0
Komsomolsk	---	70,764	---
Khabarovsk	52,045	199,364	+ 283.1
Voroshilov	35,344	70,628	+ 99.8
Vladivostok	107,980	206,432	+ 91.2

Almost a quarter (22 percent) of the entire population of the Buryat Mongol ASSR lives in Ulan-Ude. The city of Chita, however, contributes only 9 percent to the population of the region. Here the urban-industrial population is distributed among numerous places. In the Khabarovsk region the three cities Blagovshchensk, Khabarovsk, and Komsomolsk together comprise only 23 percent of the total population and something more than half the urban part of the population. Komsomolsk is a new establishment as a city and did not exist in 1926. In the coastal district the relations are similar to those in the Buryat Republic. Here around 23 percent of the total population is concentrated in Vladivostok alone. Together with Voroshilov, the two cities together comprise 31 percent of the total population. Apart from Chita, then, all the above-mentioned cities are important population centers which stand in contrast to the vast and thinly-settled regions.

/120/ Urban and Rural Population
According to the Census of 1939

	Urban Population	Rural Population	Total
Buryat Mongol ASSR	163,425	378,745	542,170
Chita Region	510,900	648,578	1,159,478
Khabarovsk Region	647,653	783,222	1,430,875
Coastal District	464,509	442,711	907,220

3: Thiel--133 K-4, 5 (no date) 1953 RR1 Siberia RR1

The Development of the Population 1939-1950

161 The development of the population after 1939 cannot be followed exactly, since no census has been taken since then and also no other official data have been published on this subject. Incidental data on individual places or regions allow a general tendency to be noted, but they are not sufficient to give a clear picture in terms of figures. The best opportunity for this is provided by the election statistics for 1950. Critical evaluation of these statistics enables us to note the total figures for the population, although to be sure the figures calculated are only approximations and contain concealed sources of error which cannot be avoided. Nevertheless the election statistics must be drawn upon, because, with the lack of other information, they offer the sole opportunity to acquire at least a survey of the development of the population.

The total population of the Soviet Far East amounted to 4,039,800 in 1939, according to the census of that year, and to around 6.3 million (including southern Sakhalin and the Kurils) in 1950. The total population, then, had increased by around 2.3 million persons in this time. While the population increased by 75 percent in the 13 years from 1926 to 1939, the increase in the 11 years from 1939 to 1950 was only 35.6 percent. If the mean natural increase in population in the Soviet Union during the period 1926-1939 (15.9 percent for 13 years, 1.22 percent for one year, 13.42 percent for 11 years) is applied to the Far Eastern region without consideration of the effects of the last world war, the resulting figures show that the 35.6 percent general increase in the population consisted of 13.42 percent from natural growth and 22.18 percent from immigration. Under these conditions the general picture of the population development in the Soviet Far East can be concluded to be as follows:

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1939 population	4,039,800
Natural increase 1939-1950	538,140
Increase through immigration	1,722,060
1950 Total	6,300,000

/121/ Even if immigration from 1939 to 1950 did not attain the measure of that of 1926 to 1939, it is nevertheless significant with its general yearly average of 156,500. Since during the six years of the war (1940-1945) all immigration was probably stopped, most of the settlers must have been brought into the Far Eastern region in the remaining five years and especially after the war; this would make the annual average almost 350,000.

The development of the population in the individual regions can also be given only in general figures. Here the difficulty is encountered that the administrative borders were changed in the years after World War II, and accordingly the data can no longer be compared in all cases. Only the Buryat Mongol ASSR and the Coastal District have remained unchanged administratively, while other regions can only be treated together.

Population Development According to Regions

	1939	1950	absolute increase	increase in percentage
Buryat Mongol ASSR	542,200	600,000	57,800	10.7 %
Chita Region	2,590,400	4,500,000	1,909,600	73.3 %
Khabarovsk District				
Coastal District	907,200	1,200,000	292,800	32.3 %
Total	4,039,800	6,300,000	2,260,200	35.6 %

The above chart shows that the main increase in population occurred in the Chita Region and the Khabarovsk District, while the percentage of increase in the other two regions is lower than the general percentage of increase.

[167] There must even have been some emigration from the Buryat Mongol ASSR. If we apply here the above mentioned percentage of natural increase in population (13.42 percent), then this alone should have resulted in an increase of 72,863. This means that around 15,000 persons must have emigrated from the Buryat Mongolian ASSR in the period from 1939 to 1950. The predominantly agrarian character of this republic--in 1939 the rural population amounted to 70 percent of the total--makes it appear completely possible that this occurred because of the progressive mechanization and technicalization of agriculture.

The absolute increase in the population of the Coastal District from 1939 to 1959 was 292,800, of which 121,750 came from natural increase and 171,050 from immigration. From individual reports on significant increases in industrial production and also from the growth of individual cities (Vladivostok increased by around 100,,000, Voroshilov by around 70,000, and Artem has passed the 50,000 mark), it can be assumed with certainty that not only the greater part of the immigration but also /122/ the greatest part of the natural population growth has generally been fed to the industrial sector of the economy.

161 A comparison with 1939 is not possible for the other regions since the administrative borders have been changed. However, a comparison can be made of the population calculated from the 1947 elections in the republics and other data from January 1, 1949, as Shabad has used them in his Geography of the USSR, in order at least to note the spatial direction and the economic employment of the population increase; for safety it must of course be conceded that both comparative sizes here do not represent exact data.

In comparison with other regions, the new Chita Region has had the smallest increase in population (150,000), of which, however, the city of Chita alone has taken a significant percentage (around 50,000) into its industry. Information on an increase in coal mining, in the production of non-ferrous metals, etc. points to an increase in the working force in industry; since also the expansion of the cultivated area in the Chita Region is difficult, it can be assumed with certainty that the largest part of the population increase has gone into industry. The relationships appear to be different in the Amur Oblast formed in 1948; this oblast includes the Zeya-Bureya plain which is important agriculturally. /Although the data here are not entirely clear, there are still numerous indications that the relatively large increase in population has benefited the agrarian sector. From this region, too, come most of the success stories in agriculture, and there is by all means the possibility of expanding the cultivated area. On the other hand, there are only a few reports of new industrial establishments. A part of the population increase has probably been drawn into the lignite fields of Raychikhinsk and Kivdinskiy and the new coal district on the Magdagachi; nevertheless, the Amur Oblast retains its predominantly agrarian character. The capital of this region, Blagoveshchensk, provides an indication in this direction, for it has even decreased its population from 61,205 to 58,761 in the period from 1926 to 1939.

A different picture is seen in the Khabarovsk District, whose total increase in population has been relatively large. Alone the growth of the cities (Khabarovsk has increased by 100,000, Komsomolsk by 80,000, Sovetskaya Gavan' has grown to more than 20,000, Magadan has passed the 50,000 mark, etc.) indicates that here the population increase has flowed primarily into industry. Indeed, if the district's total population increase can correctly be assumed to be 250,000 as indicated by the above-mentioned sources, --the figure is too low in my opinion--then there has even been a migration from the country

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to the city. There are, to be sure, reports of the expansion of the cultivated area in the Khabarovsk area, /123/ but increased employment of machinery in agriculture is repeatedly reported in announcements, so that it is undoubtedly possible that manpower has been released from the land. Sakhalin Island shows the most significant increase in comparing the estimates for 1947 (Shabad) with the figures obtained on the basis of the 1950 electorate, for Sakhalin has tripled its population from 300,00 /sic/ to 900,000. It is difficult to find an explanation for this, even if the first figure is regarded as too low and the second too high. Before the war the population of the Russian part of Sakhalin was estimated to be 100,000. During the war new petroleum fields were developed, petroleum and coal production was pushed up a great deal, a new harbor, usable the year around, was built in Okha, and many other things were done. The post-war period brought further economic exertions, and accordingly the population in the Russian part must have increased significantly during this period, perhaps to 200,000 or more. The Japanese part was occupied by 412,000 persons in 1940. For economic reasons arising out of the war the Japanese certainly increased the number of people assigned there, and in the process not only created new jobs but also built up the industrial plants. After the evacuation of the largest part of the Japanese population, the Soviets had the task not only of occupying the land but also of getting the economy back into production. For this an exchange of man for man was not possible; instead the Russians had to resort to an oversupply of manpower. But the difference in the economic system must also be pointed out. To the Japanese who managed their economy rationally the question was the employment of all manpower, while with the Soviets--especially with the political tensions of the present--the principal emphasis is on getting production going again, and the employment of people plays only a secondary role. It should further be noted that in the Japanese population the ratio of men and women was 130:100; the population thus had a colonial stamp to it. It is certain--and isolated data confirm this--that the Soviets have settled families in southern Sakhalin, and accordingly there is a different population structure than existed under the Japanese. All these reasons make it seem understandable if the present population of southern Sakhalin exceeds that of the pre-war period. And in this connection mention should also be made, in conclusion, of the political and military side of this question; for a land filled with people is in a military-political sense a much greater asset than an empty one.

3: Thiel--137 K-4,5 (no date) 1953 RR1 Siberia RR1

161 361 To these inhabitants listed in statistics for Transbaykal and the actual Far Eastern regions must be added another population, which can to a certain extent be designated as invisible, for figures on this population appear neither in official pronouncements nor in any other Soviet statements. These are the work camps, which /124/ play a not unimportant role economically because of their mobility and their massing of manpower. Little exact information can be given in detail on their employment. It is known that there are work camps in Transbaykal and also in the lower Amur region and further that most of the workers are assigned to building the Baykal-Amur railroad and also to gold and other mining installations in the area of the upper Kolyma and also in other places. The existence of the work camps makes it difficult to judge or to determine the human work potential in the individual regions. In no case can they be overlooked.

161 In conclusion a summary is given of the population in the individual regions according to the calculated level of 1950:

1.	Buryat Mongol ASSR	600,000
2.	Chita Region	1,200,000
3.	Amur Region	900,000
4.	Khabarovsk District	1,500,000
5.	Coastal District	1,200,000
6.	Sakhalin Region	900,000
	Total	6,300,000

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Estimated Growth of the Largest Cities

	1939	1950
Vladivostok	206,432	300,000
Khabarovsk	199,364	300,000
Komsomol'sk	70,764	150,000
Voroshilov	70,764	150,000
Ulan-Ude	129,417	150,000
Chita	102,555	150,000
Blagoveshchensk	58,761	60,000
Artem		more than 50,000
Magadan		more than 50,000

/125/ THE ECONOMY

Agriculture

Among the various branches of the economy agriculture stood 162
in the foreground in 1938. Of the entire population 55.8 percent were attached to agriculture; the percentage of those in agriculture in the various regions was as follows:

	rural	urban
Buryat-Mongol ASSR	70 %	30 %
Chita Oblast	56 %	44 %
Khabarovsk Krai	55 %	45 %
Maritime Krai	49 %	51 %

In the interval these relationships have changed substantially. The increase in the total population up to 1950 was 35.6 percent, and the bulk of this was in the industrial sector; accordingly the urban, i.e., the industrial population has a majority today in the entire area of the Far East. Among the various regions the Buryat Mongol ASSR has retained its overwhelmingly agricultural character. The same can also be said of the Amur Oblast newly formed in 1948, though this cannot be verified in figures.

The natural conditions for agriculture are completely favorable 241
in the southern parts of the Far Eastern region. All of Transbaykal lies 132
within the 5° May isotherm, and the Amur Oblast is included in the
main in the 10° May isotherm. The brief transition from winter to
summer lengthens the vegetation period, which is generally sufficient
here. The harsh winter, however, limits cultivation, and accordingly
summer cultivation predominates. The rainfall causes difficulties.
While a heavier rainfall could be desired for Transbaykal, the rainfall
in the Amur and Ussuri regions exceeds the amount necessary, and this
results in certain restrictions. The great dampness hampers the ripening
of the grain in the fields and fosters the appearance of vermin. Water
often remains standing on the flat fields and often leads to the rotting
of the plants. Accordingly the Russians are forced to give up European 241
flat cultivation /Flachbau/ in favor of furrow cultivation /Furchenkultur/,
in which the grain is sown on heaped up earth so that the water collects
in the furrows in the ground and can there seep in or flow off /126/.

The method is used with success everywhere in the Far East by the

241 Chinese. This method of cultivation, of course, demands more work, and the Russian clinging to his customary methods naturally struggles against it. With the beginning of collectivization the kolkhoz have employed specially constructed sowing machines which take these special conditions into account.

North of the Amur region the natural conditions for agriculture become more unfavorable. The reason for this, however, does not lie in the increasing coldness of the winter but rather above all in the shortening of the vegetation period. These regions, therefore, de- [242] pend on cultivated plants which ripen quickly. In this connection the Soviet Union has attained successes worthy of recognition in the development of types which ripen quickly and in the use of special methods of preparing seeding (Yarovisation). The Soviet Union has succeeded in moving significantly farther to the north the outer limits for grain cultivation.

134 The earth in Transbaykal in the areas preponderantly covered by forests belongs predominantly to the podsol type; numerous varieties of earth have been formed which sometimes approach loamy soil, sometimes sandy soil, according to the clay content. In the river valleys marshy and semi-marshy soil is widely diffused. The vegetable mold content of the podsol soil is only slight, being 2 percent to 3 percent; in marshy soil, however, it is large, being 15 to 30 percent. In the forest steppe areas and in the steppes of Transbaykal the soil is relatively rich in vegetable mold. East of the Yablonovyy Ridge typical black earth has even developed as far as the Argum. Interesting is the fact that the various slopes of the same ridge often show a different soil profile which corresponds with the plant growth. The north and northwest slope is covered with taiga, under which typical podsol soils lie, while on the east and southeast slopes, which are taken up by loose collections of birches, there is little or hardly any podsol; indeed, according to its external signs it already passes over here into the dark chernozem type. In the Amur and Ussuri country podsol and marshy soils with all their transitional forms take up the greatest part of the land. The soil of the Zeya-Bureya lowland and of the Ussuri-Khanka depression--the principal agricultural areas--consists essentially of young, fruitful alluvial deposits. The dark color of the upper layer of soil, rich in vegetable mold, misleads one into designating it as chernozem, black earth, but in reality it is semi-marshy meadow soil with thick layers of vegetable mold. In the dry spots this soils does in fact recall the black earth in its physical

characteristics and its structure, but in lower, damp places it clearly shows its semi-marshy origin. 134

In general, however, podsol soil predominates here; it is but a little inferior in quality to the same soils of North Germany and Central Russia, and it is well suited for agriculture. According to general /127/ estimates, the area capable of cultivation is 200,000 square kilometers in Transbaykal, 110,000 square kilometers in the Amur county, and 150,000 square kilometers in the Ussuri region--thus a total of 460,000 square kilometers. In contrast to these opportunities, the area exploited thus far for agriculture was only 1,877,900 hectares (1938) and thus only a small proportion of the total area available. However, the area under cultivation has increased 60 percent since 1913, when it was 1,171,500 hectares; and this is a mighty accomplishment for this land so distant from central Russia. 311

The growth of the area under cultivation occurred differently in the various regions as the following chart shows. The area under cultivation has more than doubled since 1913 in the Buryat Mongol ASSR and in the Chita Oblast, and this increase has been continuous in the years of the Soviet regime. The natural conditions here are similar to those of the southern Russian steppe, and require no special adaptation on the part of the Russian peasants. Conditions are different in Khabarovsk Krai and in the Maritime Krai, as has already been shown. The cultivation of new areas here is behind that in Transbaykal and shows greater variations from year to year. The decline in Khabarovsk Krai from 740,300 hectares in 1928 to 580,800 hectares goes back to the beginning of the Five Year Plans which eliminated less productive land by means of planned management. It is remarkable, however, --as official Soviet statistics indicate--that there has been a regular year by year decrease in the area under cultivation in the Maritime Krai from 1932 to 1938. (The figures from 1932 to 1938 in 1,000 hectares are: 461.8--449.6--431.6--419.9--371.0--322.0--322.0--318.3.)

The above as well as the following figures are taken from the Soviet publication, "Posevnye ploshchadi SSSR" (11).

11. "Posevnye ploshchadi SSSR" /Areas under Cultivation in the USSR/. The Dynamics of 1928, 1932-38 in Comparison with 1913. Statistical Reference Work. Issued by the State Planning Commission, Moscow-Leningrad, 1939.

311 The Development of the Area under Cultivation in 1000 hectares

	Buryat-Mongol ASSR	Chita Oblast	Khabarovsk Oblast	Maritime Krai	Total
1913	191.6	287.2	471.4	201.3	1,171.5
1928	203.7	407.7	740.3	413.0	1,764.7
1938	386.7	592.1	580.8	318.3	1,877.9

214 Among the plants cultivated, grain by far stands in first place in all four regions. In the Buryat-Mongol ASSR 90 percent and in Chita Oblast even 92 percent of all the area under cultivation (1938) was devoted to grain; and accordingly the two regions can be regarded as pronounced grain areas. In Khabarovsk Oblast the proportion devoted to grain is 75 percent and in the Maritime Krai it is 69 percent. As is appropriate to the climatic conditions, the cultivation of summer grain predominates. Winter seeding in all four regions together takes up only 27,500 hectares, which is 1.5 percent of the area under cultivation.

/128/ The Cultivation of Grain in 1938 in 1,000 Hectares

	Total Area Devoted to Grain	Winter Grain	Summer Grains Wheat	Oats	Barley
Buryat-Mongol ASSR	348.8	10.8	133.2	84.9	14.7
Chita Oblast	543.0	6.4	275.4	167.1	31.8
Khabarovsk Oblast	446.0	0.8	242.4	177.6	2.5
Maritime Krai	276.0	9.5	88.3	82.6	6.0

The cultivation of little paying summer rye predominated in the Buryat-Mongol ASSR before 1914, but since then this has been displaced more and more by wheat. By 1938 wheat was at the top of the list of plants cultivated, having 40 percent of the cultivated land devoted to it, and only 27 percent of the agricultural land was devoted to summer rye. The cultivation of potatoes, vegetables, and feed for livestock was entirely lacking earlier, but at present it is being strongly pushed, and by 1938 it had already reached 6.2 percent. In the Chita Oblast the cultivation of wheat has increased considerably and has tripled since 1913. Having 46 percent of the land under cultivation, it comprises exactly half the land devoted to grain. By 1938 only 6.9 percent of the land was devoted to summer rye, which once dominated. A comparatively large area--3.4 percent of the total--is devoted to buckwheat. In contrast to this monotonous one-sidedness of grain cultivation in Transbaykal, the agrarian picture in the Amur and Ussuri country is more lively and more varied. Here, too, however, grain cultivation predominates, having 75 percent of the area under cultivation in Khabarovsk Oblast and 69 percent in the Maritime Krai. The sunflower is heavily diffused in the Zeya-Bureya plain, despite its damp climate, and recalls the home fields of the Russians in Europe. In the Ussuri region corn, too, again comes into its right, while the sunflower appears not to flourish here. In addition there are two important East Asiatic oil plants which are represented fairly equally in the two regions: the soy bean and the Perilla. The soy bean, which has more than 80,000 hectares of land devoted to its cultivation (1938), is, with its content of 13 percent to 21 percent fat and 35 percent to 38 percent albumen, an extremely valuable product for human and animal nourishment and also for industrial use. Of special importance is the fact that the soy bean enriches the soil with nitrogen and thus raises the yield of the succeeding planting. The Perilla (Perilla arguta), which is related to the sesame, delivers an excellent technical oil. The areas devoted to its cultivation, which was 4,500 hectares in 1938, is being expanded in a planned fashion. In the southern part of the Ussuri region various types of millet are cultivated by Chinese colonists, while the Koreans often devote themselves to the cultivation of rice, which extends into the region of Khabarovsk. Of other technical cultivated plants, flax, hemp, and tobacco are represented in the Ussuri country. The cultivation of sugar beets has special importance; it was introduced after 1920 and has attained a fairly great diffusion in the area of Khanka Lake. The beets are processed in the sugar factories in /129/ Voroshilov (Nikol'sk-Ussuriyskiy) and already cover a large part of the sugar requirements of the Far Eastern region.

In the wide expanses of the north, agriculture is developed only sporadically and serves above all for self-supply. With the exception of on the Chukchi Peninsula, there are very often small gardens with beets, radishes, potatoes, etc., and less often with oats and barley near the settlements. Only Kamchatka has an agriculture worthy of mention; in 1938 it had around 2,800 hectares under cultivation.

Of the four adminstrative units, the Buryat Mongol ASSR and Chita are the only ones which attain a surplus of grain. Both are well on the way to becoming real granaries, but at present their production

241 is still not sufficient to cover the deficit of the two other regions.

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Area Under Cultivation Per Person as of 1938

	Total Area Under Cultivation in 1000 hectares	Area Under Cultivation Per Person in hectares	Total Area Devoted to Grain in 1000 hectares	Area Devoted to Grain Per Person in hectares
Soviet Union	136,943.1	0.80	102,411.0	0.60
Buryat-Mongol ASSR	386.7	0.71	348.0	0.65
Chita Oblast	592.1	0.51	543.0	0.47
Khabarovsk Oblast	580.8	0.41	446.0	0.31
Maritime Krai	318.3	0.35	216.0	0.24
Transbaykal and the Far Eastern Region	1,887.9	0.47	1,553.8	0.39

241 No statistics of equal worth are available for judging the development of agriculture from 1938 to the present, since no such statistics have been published since then. Instead a great number of bulletins from the Soviet press are on hand; but these contain only isolated data of a general type, or special reports from highly variable areas or even localities. It is difficult to form an overall picture from all these reports, but it is the only possibility of being able to get at least a glance at the development.

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311 Many reports speak of an immigration which benefits both the industrial and also the agricultural sector. Also the enlargement of the area under cultivation and the raising of production often form the subject of these reports, and in this the results of the last Five Year [312] Plan, up to 1950, are especially emphasized. In the steppe regions of the Chita Oblast a beginning has been made in the introduction of artificial irrigation. As a beginning for this, numerous canals were dug in 1948 which irrigated 12,850 hectares. In the vicinity of the big cities the greatest attention /130/ has been devoted to the development of farming near the city and especially to garden farming. In the surroundings of Vladivostok the setting up of 1,560 hectares of garden area in 1948 was envisaged in the framework of a great plan. Also in the Khabarovsk area important wild areas are being converted into cultivated land so as to ensure the feeding of the growing city.

Here in 1950 a Melioration Machine Station was erected, the first in the Krai, which is to be followed by seven others. Of great significance is the development of agriculture on the Kamchatka Peninsula. Before World War I, according to Soviet figures, the area under cultivation was 4 hectares; in 1938 it was 2,778 hectares. Since then it has further increased. In 1950 there were more than 10 kolkhoz. In 1952 a scientific expedition was sent out from Khabarovsk to Kamchatka to investigate and to prepare for the gaining of additional land for agriculture. In the same year two Melioration Machine Stations were erected, which in the next three years made nearly 40,000 hectares of swamp and taiga country available for agriculture. From Sakhalin, too, successes in the winning of new land were reported. Prominent is the fact that also the native population (Gilyak in the "Chir Unvd" Kolkhoz, i.e., "New Life Kolkhoz") has been used with success in agriculture. How quickly the agricultural occupation of southern Sakhalin has been carried out is indicated by two reports: in 1949 there were 33 kolkhoz there and 3 sovkhoz, and in 1950 there were already 69 collective farms. 241 311

The progressive mechanization and technicalization of agriculture constitutes a second important part of the content of the more recent reports. The number of Machine Tractor Stations (MTS) has increased in all regions. In the Buryat Mongol ASSR their number increased from 25 in 1937 to 36 in 1948; in Khabarovsk Krai they almost doubled in number from 1938 to 1947, when they numbered 76. In 1948, 25 Grass Mowing Machine Divisions were installed in the Buryat Mongol ASSR; and from 50,000 hectares of meadowland these Divisions were supposed to supply winter hay for the great kolkhoz, since the manual work force was not sufficient. In the Buryat Mongol ASSR the first agrarian city in the Soviet Far East was also established in 1950, and for this 400 two-story dwellings and 30 one-family houses were constructed. Remarkable, too, are the reports that special mowing threshers were used in harvesting the soy beans and the rice. 241 407 [475]

Among the plants whose cultivation has been especially fostered, soy beans and rice stand in first place. In 1949 there were 16,000 more tons of soy beans harvested than in 1948. With rice cultivation, on the other hand, progress seems to be made only slowly. In 1937 in the Far East 36,400 hectares were cultivated with rice, and, according to the last Five Year Plan, the area is to be increased to 37,000 hectares by 1950; this is very modest considering the fact that in 1913 there were 57,000 hectares of rice fields. Great attention is also devoted 241

241 to the cultivation of sugar beets; the area devoted to their cultivation has again increased in the Khanka Lake area. Tea is supposed to [242] become a new product of the /Russian/ Far East. In 1950 /131/ the Botanical Institute of Leningrad sent an expedition there in order to explore, by attempts at cultivation, the practical possibility of planting tea bushes.

241 433 All the reports mentioned above are only individual pictures of the agricultural film which is being run in the Far East. These pictures show the great strivings of the Soviet Union to use all its power to advance agriculture in these regions. If the grain harvest in the actual Far Eastern area had increased 150 percent in 1947 as compared with 1913 and the potato harvest had even increased 200 percent (Trud, 25 October 1947), this increase in production stands in contrast to an approximately 300 percent increase in population in the same period; accordingly even today the same problems still exist in supplying the population of this area with food, as has been described in the above chapter, since an additional population increase runs parallel to the increase in production, even though the two curves may perhaps have gotten somewhat closer since 1947. The actual Far Eastern regions (not including the Buryat Mongol ASSR and the Chita Oblast) can still be regarded even today as import areas in terms of food. Their dependence on obtaining supplies is alleviated by the increased cultivation of potatoes and soy beans, and import at present is no longer a problem since Manchuria with its agricultural surplus has been brought into the Soviet sphere.

Animal Breeding

231 433 In the livestock-breeding of the Soviet Union Transbaykal assumes a prominent position. While on the average there are 233 cattle to 1,000 persons in the Soviet republic, there are 1,367 cattle to 1,000 persons (1938/39) in the Buryat Mongol ASSR; and while there are 602 sheep and goats per 1,000 persons on the overall average in the USSR, there are here 1,786. The important livestock-breeding areas lie left [232] of the Selenga and right of the Ude. The breeding of better strains is being carried out according to plan by crossing the Mongol cattle with the Simmentaler and by crossing the native sheep with the Rambouillet-Merino. The steppe region left of the Selenga is thus the breeding ground for improved strains. The livestock here is housed for the winter in warm stalls and fed with prepared feed. The horse, which constitutes

11.7 percent of all the livestock, and also the pig, which constitutes 231
6.7 percent, play a slight role in the animal economy. The situation 433
of animal breeding in Chita Oblast is similar and has the same favorable perspectives. Dairy farming stands in the foreground here in [234]
cattle breeding. In the steppe regions of the Onon and Argun a number of studs also serve horse-breeding. In the same region camels are also bred, whose number is given at 7,000. Transbaykal as a whole is a surplus area both in grain cultivation and in animal breeding.

/132/ The following table indicates how very prominent the Buryat Mongol ASSR and Chita Oblast are in animal breeding in the overall economy of the Soviet Union:

On a collective farm in 1938 there were:

	Soviet Union	Buryat Mongol ASSR	Chita Oblast
Horses	0.7	2.0	2.5
Cattle	2.2	6.0	6.5
Sheep, goats	2.9	19.0	11.9

It is different in the Amur and Ussuri country. Animal breeding is insufficient and doesn't even cover the needs of the area. Even horses must be imported. In the southern part of the Ussuri region milk and work cattle are kept; otherwise a dairy cow farming worthy of mention has developed only in the vicinity of the cities. Meadowlands are lacking for the maintenance of cattle on a large scale. On the other hand cattle can be found in isolated cases everywhere, even in the far north. On Kamchatka their number reaches several thousand. The number of pigs in the Amur and Ussuri region is comparatively larger than in Transbaykal since the Chinese and Koreans also keep pigs. The quality, however, is low. In meat supplies, too, the Far Eastern region requires additional imports.

The reindeer breeding in the extreme northeast of the region deserves special attention. The moss tundra extending from the Chukchi Peninsula into Kamchatka offers excellent grazing land. With the European north, these regions stand in first place in reindeer breeding in the Soviet Union, which has contributed in its further development by establishing several reindeer sovkhoz. The number of animals is estimated at a total of approximately 750,000. The reindeer not only provides meat for local needs, but also provides meat for canning, for which a special factory has been erected in Anadyr'. The hides of

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133 the young reindeer are processed for leather and as wild leather (chamois leather) are a product in demand for export.

Hunting

224 The valuable fur-bearing animals, once so numerous, have almost completely disappeared from the settled areas and have withdrawn into the inaccessible wastelands. And, nevertheless, the Far Eastern region with its vast, wild forests is still, even today, a grateful empire of hunters. Approximately a third of the furs acquired in the Soviet Union are won in the Far East. Transbaykal is not so active in this. Squirrels and foxes provide the bulk of the skins ; the sable has been completely exterminated in wide stretches of land and is now only rarely encountered. In the tundra region the Polar fox is the most important animal hunted. /133/ The number of large wild animals has also been heavily decimated by the earlier rapacious hunting. The spotted stag /Fleckenhirsch/, sought because of its "Panten" /unhardened antlers/ and formerly very numerous in the Amur and Ussuri region, occurs now only very rarely in the open hunting ground and is kept today only in animal parks in the Sikhote-Alin'; of these seven are known with several thousand stags. For the protection of the plant and animal world rather large areas in the Sikhote-Alin', on Kamchatka, and on Lake Baykal have been declared nature protection areas.

Hunting for fur-bearing animals is organized by the state and is done from numerous "bases," where the hunter receives not only his hunting equipment but also other necessities of life, and then goes out to hunt in cadres. In their hunting, these state hunters have to follow fixed instructions, varying from place to place, for the sparing and preservation of the wild life. At the end of the hunting period the skins are delivered to the bases, and the hunter is paid according to his output.

Fishing and Hunting of Sea Animals

226 In Transbaykal, which lies inland, fishing has only a subordinate role. Apart from small lakes, which are, however, rich in fish, the fishing practised professionally is concentrated on Lake Baykal. Its outstanding fish is the omul (Coregonus omul Pall.), a type of salmon, [255] whose spawn is bred and set out. Some fish canning factories in various 000 localities on the coast process the catch not used locally. Notinsignicant

Not insignificant
also is the catch of seals (Phoca sivirica), which are preserved in large 225
numbers in Lake Baykal.

Of much greater importance, however, is the fishing in the 226
rest of the Far Eastern region. For the economy of the natives it not uncommonly constitutes the sole or at least the principal source of food. But the Russian settler, too, would not like to miss fish on his menu. Thus everywhere in the Far Eastern region where even a brook extends through the land we find the occupants occupying themselves with supplementing their food needs by fishing. In this the historical development also plays a certain role, for the first Russian settlers found one of the principal sources of food in catching fish. And nature has blessed the entire area with lakes and rives rich in fish. In addition there is the fact that off the entire coast of the Far Eastern region there stretch seas which are likewise exceedingly rich in fish and which belong to the most important fishing grounds on the earth. Year after year innumerable types of salmon in vast numbers come from the sea for the spawning period and go up the rivers and often far into the land, where men wait for them in order to provide nourishment for themselves and for their animals, not only temporarily but also often for the entire year. For the bulk of the coast of the north fishing constitutes /134/ absolutely the sole basis of existence for man. If the coastal strip far into the north is inhabited, this is above all due to the sea and its abundance of fish and sea animals.

The wealth of fish and sea animals of all kinds in the peripheral 228
seas has, through fishing for self-supply by the population on the coast and inland, led to the development of industrially run coastal and high sea fishing, which has become the leading branch of the economy in the Far Eastern region. Through the creation of a state fishing fleet and the equipment of this fleet with modern motorboats, trawlers, and special ships for catching crabs/shrimp and whales, the Far Eastern region by 1938 had won first place within the Soviet Union in terms of its catch. More than a fourth of the total catch of fish and of the canned fish goods in the Soviet Union comes from the Far East.

Catch of Fish in the Far Eastern Region

1913	107,330 tons
1928	161,820 tons
1932	346,800 tons
1937	404,800 tons

228 The total catch from sea fishing in the USSR in 1938 was 1,490,000 tons, of which the Far East contributed 25.2 percent, followed by the Volga-Caspian area with 23 percent. A total catch of 2.2 million tons was planned for 1950. On the whole it was filled only by 96 percent, while the Far East overfilled its quota by 50 percent. Accordingly the Far East's percentage of the total catch of the Soviet Union has grown still more. More exact figures on the individual regions have not been published. A total catch of 3,476,000 tons is planned for 1955 for the Soviet Russian sea fishing industry.

In evaluating the catch of the various areas, however, it must be taken into consideration that in the Far East especially valuable types of salmon constitute the bulk of the catch. Furthermore it should be brought up that because of its small population and therefore its own low requirements, the Far East belongs to the most important surplus area. As a consequence of this development an active fish industry has come into being here. All the larger places on the coast have cold-storage houses. [255] However, there has been a special rise in fish canning factories, whose number has risen from 2 in 1913 to 42 in 1938. At the same time in connection with these, factory installations have been created which produce on the spot the necessary requirement of cans. In addition there are special ships which process the catch right on board. In this connection the ships for catching crabs/shrimp should be mentioned; these ships can be described as floating canning factories. Their work area is the /135/ west coast of Kamchakta. In catch of crabs/shrimp the Far Eastern region has first place in the world.

The coastal area on the Sea of Japan from the Korean border to the Tatar Strait constitutes the most southerly fishing district. Here herring and sardine fishing stand in the foreground. Fishing is done above all in the bays, with the richest catches coming from the Bay of Peter the Great. The center of this and the processing point is Vladivostok, which has a modernly equipped canning industry. In the years before 1938 the catch of herring went in part to the interior and in part to Japan.

The area around the lower course of the Amur constitutes the second fishing district. This great river serves as preferred spawning ground especially for two of the Pacific types of salmon: the beloved Keta salmon (Oncorhynchus Keta Walb), which provides red caviar and is called dog salmon by the Americans; and the somewhat smaller gorbusha (humpback salmon, Oncorhunchus gorbusha Walb). There are some curiosities in the appearance of these types of salmon, especially the gorbusha. Peter Schmidt has devoted a detailed investigation to them (Osteuropa /East Europe/ 1928, II), and points out that these types of salmon have not multiplied as much as the European types, since they spawn only once during a lifetime and in addition lay only approximately a tenth the number of eggs that, for example, the Rhine salmon lays. Especially interesting, however, is the fact that the appearance of the swarms of gorbusha has a remarkable two-year periodicity. L. S. Berg (27) gives the following figures on the catch of gorbusha in millions of fish: According to L. S. Berg this two-year periodicity in the Amur district developed only since 1908, while no such periodicity has been determined on the coasts of Kamchatka; on the contrary, the Keta salmon appears regularly every year in both regions. As a result of the two-year periodicity of the appearance of the gorbusha there is also a corresponding fluctuation in the total catch of the Far Eastern region. The excess of fishing in the area of the lower course of the Amur is counteracted by artificial breeding of salmon spawn. The center of this fishing district is Nikolayevsk on the /136/ lower Amur, where 75 percent of the total population serves the catching and processing of fish.

1914	14.5	1921	0.2
1915	1.0	1922	9.0
1916	9.2	1923	0.0
1917	0.5	1924	12.2
1918	14.9	1925	0.0
1919	0.4	1926	14.1
1920	12.0	1927	0.0
		1928	16.4

The third fishing district is the eastern side of Sakhalin Island, where in addition to the various types of salmon, herring, cod, tuna fish, and mackerel above all are caught. In contrast to the other fishing districts, however, Sakhalin Island falls behind in importance.

The main fishing district of the Far East, which has been de-

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27. Berg, L. S., Landshaftno-geograficheskie Zony SSSR /The Landscape Geographical Zones of the USSR/, Part I (Moscow, 1931), p. 390.

veloped most heavily in recent years, is the Kamchatka Peninsula. The highly valued Pacific salmon types stand in first place in the catches here: red, silver, and king salmon (Oncorhynchus nerka, Oncorhynchus kisutch, Oncorhynchus tschawytscha Walb). All the rivers on the peninsula and on the neighboring mainland are visited annually by great swarms of salmon, and accordingly the processing is divided among numerous coastal localities, which are discussed in detail in the discussion of the Kamchatka Peninsula. The Sea of Okhotsk off the western coast of Kamchatka appears to be especially favorable to the development of ~~crabs/shrimp/Krabben/~~which regularly appear in the spring come to the shores from the depths of the sea, where they spend the winter. Therefore, the crab/shrimp-catching fleet is also stationed here. The seas around Kamchatka, especially the Bering Sea, are, in addition, rich in sea suckers /Seesäuger/ such as walruses, seals, and whales, although the latter are in the process of dying out. Petropavlovsk, which is the administrative center of the peninsula, constitutes the center of the hunting of sea animals. How very much the rise in the catching of ocean fish and sea animals has influenced the development of Kamchatka is shown best by the increase in population, which in 1914 was estimated to be less than 20,000, which grew to 30,000 in 1926, and which by 1948 had already exceeded 120,000. The surplus of fish caught here is used for the other parts of the Soviet Union, or is available for export, with western Europe as the principal consumer.

A peculiar and typically East Asiatic fishing industry has developed on the southern coast of the Ussuri country. The principal objects of this industry are sea cucumber /Seegurke/ "trepang" (Holothuria edulis) and the sea cabbage/Seekohl/, a kind of seaweed (Laminaria saccharina). The edible trepang is fetched from a depth of 4 to 10 meters with special anchors or by divers. The sea cabbage is torn from the floor of the sea with hooks and comes dried out to the market. Both sea products go to China where they are an especially beloved food.

The entire Soviet Russian catch of ocean fish in the Far East is included in the organization of "Dalrybtrest" (Far East Fishing Trust), which has its seat in Vladivostok. The fishing concessions in the vicinity of the Russian coasts, assured at one time to the Japanese through treaties, have become untenable through the outcome of the last war. It should not be assumed that these treaties will be renewed, and accordingly extensive possibilities of development stand open to the Soviet Russian catching of ocean fish in the Far East.

000 catching of ocean fish in the Far East.

/137/ Natural Resources and Industry
Coal Supply

Transbaykal

135 Transbaykal in general is not poor in coal, but this coal is divided among numerous individual supplies, which even today are in part removed from transportation and which are highly variable in quantity and quality. As a rule these coal deposits are all of Jurassic age and should be classified predominantly as brown coal in quality. There is no real hard coal in Transbaykal. The most important coal deposits are the following:

1. Tarbagatay, on the right side of the Khilok in the valley, between the Tarbagatay and Tolboga stations on the Transbaykal railroad. The Jurassic brown coal with a heating value of 4,979 calories lies in two seams, 8 meters and 4 meters thick, which are separated from one another by a 9-meter thick layer of earth. The entire supply is declared to be 50 million tons. The exploitation began already in 1890, and is at present carried out in several shafts; water break-ins make the work very difficult. Annually 200,000 to 250,000 tons are extracted.

2. Khalyarta. The coal lies in a terrace in the valley of the Tolboga, a tributary of the Khilok; the mines are 12 kilometers from the Tolboga station and 17 kilometers from the mines of Tarbagatay. The quality of the coal is the same as that of Tarbagatay, only the seams are less thick (4.5 meters and 5 meters). A branch railroad line connects the mines with the Transbaykal Railroad. The total supply is 1,335,000 tons.

3. Chernovskoye, 18 to 20 kilometers west-southwest of Chita, in the vicinity of the Chernovskoye station, where a city with more than 10,000 inhabitants has come into being. The coal lies in the valley of the Ingoda, on the left side of the valley between the two tributaries, the Chernovka and the Kadala, from which the coal apparently continues as far as the city of Chita. The brown coal, which has 5,000 to 5,400 heating calories, is of higher value than the coal in other deposits. Of the five seams, three, which are 1.0 meters, 2.5 meters, and 5 meters thick, have been exploited since 1914. They were begun with open work, but because of the climatic conditions they have now been turned into underground mines. The entire supply

135 has not been determined exactly; the claims range between 19 and 33 million tons. Before the war the annual production reached 450,000 tons, but now, along with the mines of Bukachacha, these mines stand at the top in production in the Chita Oblast.

4. Kharamangutsk. The coal deposits lie approximately 4 kilometers from the Darassu station on the Transbaykal Railroad in the vicinity of the locality Kharamagutsk. The Jurassic brown coal lies in two seams worth mining; of these the upper seam, which is 1.8 meters thick, is being worked by two mines.

/138/ 5. Kholbon, 20 to 25 kilometers west-southwest of Nerchinsk, on the left bank of the Shilka, where the deposit with a width from 5 kilometers to over 8 kilometers extends along the river. Several mines supply the Jurassic brown coal with a heating value of 4,615 to 5,231 calories from the first and fifth seam, which are 2.5 meters and 14 meters thick. Both open-work and underground mining are used. The other seams are not worth mining.

6. Bukachacha is the most important coal deposit in Chita Oblast. It lies north of the Transbaykal Railroad in the valley of the Bukachacha River and covers an area of 25 square kilometers. It is connected to the Transbaykal Railroad by a branch railroad line 41 kilometers long, which was built in 1929. In all, nine seams have been determined, of which the largest is 6 meters thick. These nine seams, however, don't appear everywhere, and vary greatly in their stratification and quality. Tectonic occurrences have transformed a part of the Jurassic brown coal into a type of hard coal, which is also supposed to be suitable for making coke. Before the war four shafts were worked in underground workings, which were considerably expanded by new installations after the war. Bukachacha today stands at the top in production in Chita Oblast. The total supply is claimed to be 80 to 100 million.

7. Khara Nor, southeast of Borzya, approximately 2 kilometers from the Khara Nor station. The brown coal of Jurassic age here lies in a dry valley, 8 to 10 kilometers wide, under a Post-Tertiary covering of less than 20 meters. All told there are 10 seams here, but of these only two, which are 5 meters and 15 to 17 meters thick, are worth mining. The supply is numbered at 11 million tons. The heating value, which is 5,660 calories, is above that of the usual brown coal. Above all, special attention is called to the high content of volatile elements, which constitute 60 percent and which make the coal especially suited for use for the chemical industry. Mining was begun but then later

stopped. There are no reports on the present situation.

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8. Duroy /possibly: Dauriya?/. The deposit is in the extreme southeast of Transbaykal and stretches along the Argun between the localities of Duroy and Kaylastuy. Three seams, which are 0.5 to 1.5 meters thick, extend here over an area of 20 to 25 square kilometers. The quality of the brown coal, which has a heating value of 5,254 calories, is good. The total supply is estimated at 30 million tons.

Still other brown coal deposits have been found on the Argun, but nothing is known of their size and quality.

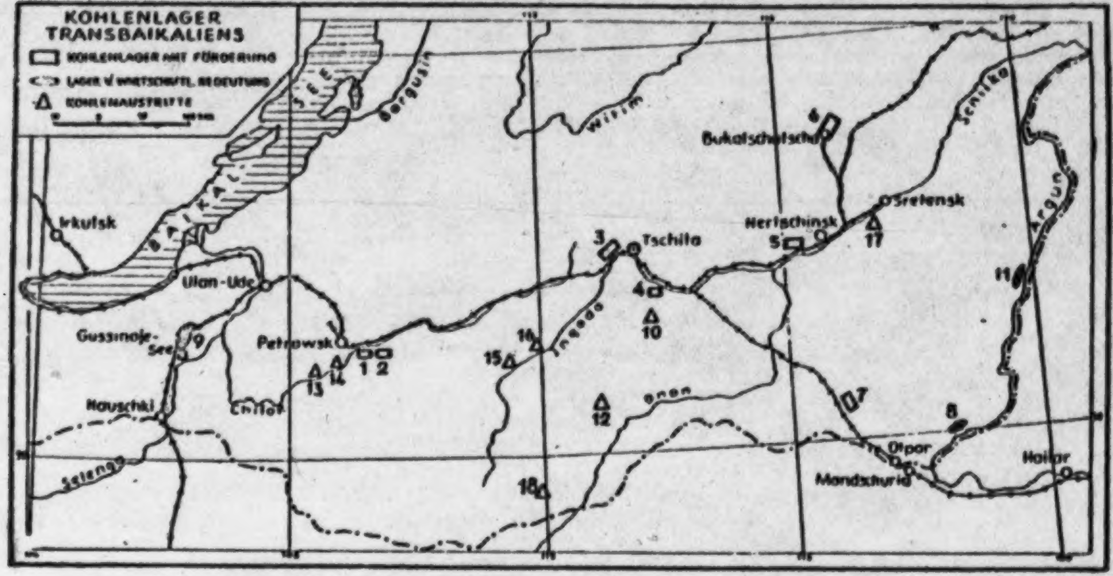
9. Gusinoye Lake. Only in the last few years, after World War II, have the size and importance become known of this deposit on the well-known "Goose Lake" in the Buryat Mongol ASSR. This deposit extends over a great distance northwest and southeast of the lake. All told seven seams, which are 0.80 meters to 9.25 meters thick, have been found. The total thickness of the seams worth mining is supposed /139 Sketch Map of the Coal Deposits in Transbaykal:/ /140/ to be 23 meters. The total supply is estimated to be 200 to 250 million tons. The quality of the coal suffers from the high ash content. In addition to the chemical industry, which has come into being on the Gusinoye Lake, the extraction of this coal is supposed above all to supply the railroad from Ulan-Ude to Ulan Bator. A power station based on this coal is already in production near Tomcha.

Still other supplies are known in addition to these most important coal deposits, but these others have still not been explored sufficiently, and there are no statistics available on them.

Amur Region

In contrast with Transbaykal, the Amur area has coal deposits which have the character and quality of hard coal, although these deposits are also Jurassic formation. The causes for this rise in quality in comparison with the Transbaykal coal cannot be ascertained everywhere in detail. It only remains to follow the sources and to give the corresponding figures. In general the Jurassic coal deposits in the Amur region are very strongly involved in the faulting process, and are divided into a large number of small deposits by elevations, depressions, and breaks along with the ensuing wearing down of anticlines. However, despite this splitting up, these small deposits, for the sake of a survey, can be classified together in individual large basins. Contiguous coal

/Sketch Map of the Coal Deposits in Transbaykal:/


KOHLENLAGER TRANSBAIKALIENS
KOHLENLAGER MIT FÖRDERUNG
LAGER V. WIRTSCHAFTL. BEDEUTUNG
KOHLENAUSTRITTE
BAIKAL SEE
Bargusin
Witim
Irkutsk
Ulan-Ude
Gussinoje-See
Petrowsk
Kiachta
Tschita
Nertschinsk
Sretensk
Bukatschatscha
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▭ coal deposits with mining
● deposits of economic importance
△ appearances of coal (Kohlenaustritte)

1. Tarbagatay; 2. Khalyarta; 3. Chernovskoye; 4. Kharamangutsk; 5. Kholbon; 6. Bukachacha; 7. Khara Nor; 8. Duroy; 9. Gusinoye Lake; 10. Tyrgetuy; 11. Chalbucha; 12. Ureya River; 13. Katayeva; 14. Kuli; 15. Klyuchevsk; 16. Gorekinskoye; 17. Matsiyevskoye; 18. Brytse River.

S: Thiel--155K-45(no date) 1953   RF. Siberia RR1

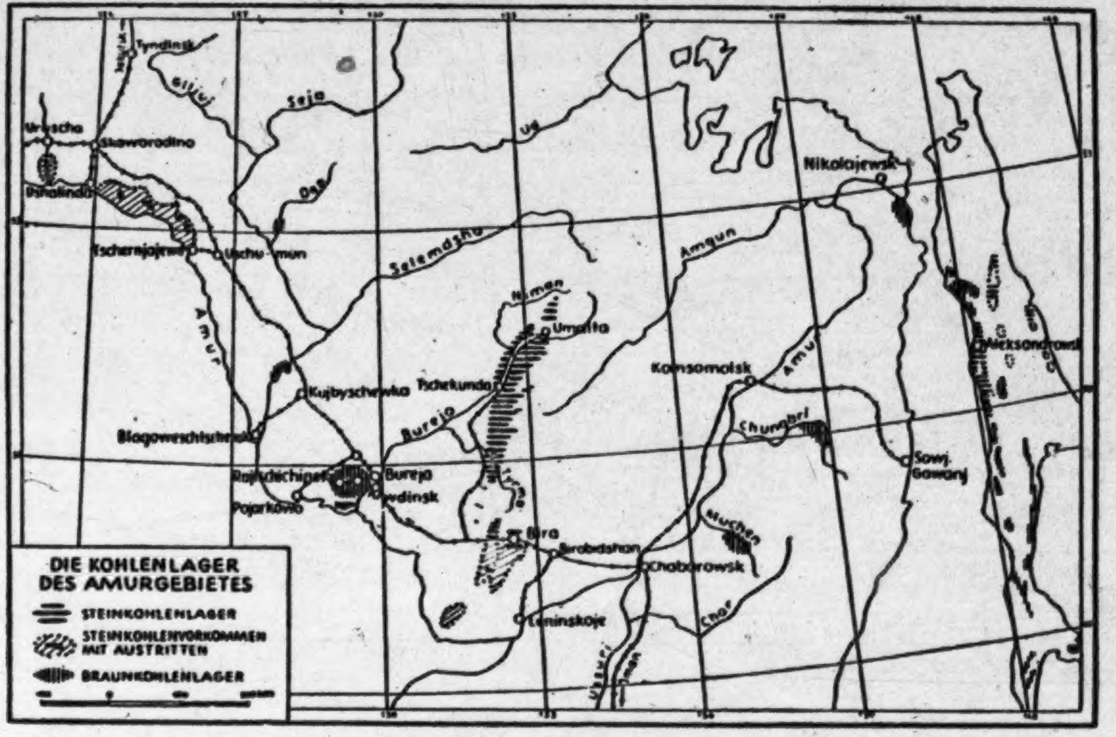
135 fields of a more or less large size occur only rarely.

Hard Coal Deposits

1. Birobidzhan. The hard coal deposits here are a continuation of the Hegan coal fields in the Lesser Khingan, which extend from the Manchurian side over the Amur toward the northeast. In Birobidzhan these coal fields appear in numerous small deposits in a total area of 250 square kilometers. The most important deposits are near the city of Bira on the Amur Railroad and extend above all in the valley of the Turuk (Russian Birsko-Turuskoye Deposit). Near the Bira station the coal appears at the surface in a "coal mountain" and is mined here in three seams which are 0.75 meters, 0.70 meters, and 2.10 meters thick. A second deposit lies near the Londoko station and extends toward the north in the valley of the Kamenushka. The other deposits are insignificant.

2. Upper Bureya. Here are the largest coal deposits in the Far East in terms of area and supply. They extend over a total area of more than 4,000 to 5,000 square kilometers, and in this the geological border has still not been exactly determined. The coal-bearing layers extend only slightly on the right side of the Bureya and are limited here in the bulk to a long stretch of 180 kilometers in the region between the Umalta and the Niman. On the left /141//Sketch Map of the Coal Deposits in the Amur Region/ /142/ side of the Bureya the deposits have a greater width; for example, at the tributary, Urgal, seams are found up to a distance of 65 kilometers from the mouth. The complexity of the stratification, caused by tectonic formations, is a great handicap both in exploring and also in exploiting the deposits. The conditions appear most favorable in the central Urgal valley, secondly in the Yoreksko-Olonzhinsk Rayon, and thirdly along the Bureya from Ust'-Urgal to Ust'-Niman. Here up to 20 seams have been determined, but of these only nine, with a total thickness of 40 meters, are worth mining, and they lie up to 600 meters deep. The coal-bearing layers otherwise have in general a thickness of more than 1,000 meters. The quality of the coal varies and ranges in heating value (Yorek deposit) from 6,043 calories to 8,018 calories. Numerous tests and trials have shown that a large part of the deposit can be used as coal for coke; however, the high ash content occurring in many cases forces the use of special methods. The geological total supply is given at 60 billion tons, of which 45 billion belongs to the upper Jurassic and 15 billion to the Lower Cretaceous.

Sketch Map of the Coal Deposits in the Amur Region:


Tyndinsk
Giljui
Seja
Uruscha
Skaworodino
Dschalinda
Dsa
Uchu-mun
Tschernjajewo
Selemdsha
Uj
Amur
Niman
Umalta
Tschekunda
Kujbyschewka
Bureja
Blagoweschtschensk
Raitschichinsk
Bureja
Swobodny
Pojarkowo
Amgun
Nikolajewsk
Komsomolsk
Amur
Chungari
Alexandrowsk
Sowj. Gawanj
Bira
Birobidshan
Chabarowsk
Muchen
Leninskoje
Chor
Ussuri
DIE KOHLENLAGER
DES AMURGEBIETES
STEINKOHLENLAGER
STEINKOHLENVORKOMMEN MIT AUSTRITTEN
BRAUNKOHLENLAGER

☰ hard coal deposits

▨ hard coal deposits and where they come to the surface /Steinkohlenvorkommen mit Austritten/

‖ brown coal deposits

More recent investigations have even estimated the possible total supply at 120to 130 billion tons. (8) 135

8. Energeticheskie resursy SSSR /The Sources of Energy in the USSR/, 2 vols., (Moscow: Academy of Science, 1937 and 1938), Vol. I, p. 80.

3. Tyrma Basin. This coal basin is a continuation of the deposit on the upper Bureya and is separated from that deposit only by tectonic occurrences with subsequent erosion. The main deposit is on the Bureya. The coal-bearing layer has a thickness of approximately 400 meters and, in addition to various seams of little value, it contains two seams whose thickness varies locally between 1.5 meters and 5.0 meters. The quality of the coal is supposed to be inferior to that in the basin of the upper Bureya. Apart from this, however, it has industrial importance because of its nearness to the Amur railroad.

West of the Bureya, hard coal occurs only in small deposits, for example on the Dep River, 45 kilometers before it empties into the Zeya. The deposit has a supply of only 490,000 tons and is used for supplying the Zeya River ship transportation. An additional, large deposit on the upper Amur has only recently come to the foreground in interest. It stretches along the Amur, and appears in the valley basins of the Amur tributaries, the Urusha, the Kerak, the Burinda, and the Magdagachi with numerous appearances on the surface. Having a mean heating value of 5,064 calories, its quality is slight, but some seams in spots have the character of anthracite and semi-anthracite. Mining was begun in 1947 at Magdagachi.

Brown Coal Deposits

1. Lower Bureya. These are the largest brown coal deposits in the Amur region. They stretch from the lower course of the Bureya in the east to the /143/ Savitaya in the west between the Amur River and the Amur Railroad. They are of the Tertiary period (Miocene and Pliocene), and as a rule, they form only one seam with a thickness of 2 to 7 meters with a mean thickness of 6 meters. The brown coal is in part extracted in open workings. The most important mines are near Kivdinsk and in Raychikhinsk, whose productions before the war reached approximately 700,000 tons for the two mines together. After the war new installations with a production capacity of 250,000 tons

135 were created. An inadequacy lies in the fact that the brown coal is very damp in the earth, and, when exposed to the air, it disintegrates in parts into fine grains like sand. The total supply is given at 510 million tons, of which 245 million tons fall in category A-1.

2. Mukhen Deposit, in the basin of the Mukhen River, 130 kilometers northeast of Khabarovsk. Here two seams have been determined with a thickness of 1.6 meters and 3.2 meters; these seams lie only 7 to 10 meters under the surface. The quality is not outstanding and comes close to being a type of lignite.

3. Khungari-Deposit in the area around the middle course of the Khungari River, which empties into the Amur below the Mukhen. The Tertiary coal deposit was discovered only in the 1930's. It constitutes two seams, each 2 meters thick, whose coal has a heating value of 4,017 calories and 5,179 calories respectively.

4. Naloyevskoye Deposit, which also has been discovered only recently. The coal lies on the shore of the Tatar Strait, approximately 20 kilometers south of the mouth of the Amur.

Maritime Krai

The Maritime Krai is relatively better explored than the other regions in the Far East. Therefore, much more can be said about the coal deposits in this area. All told 69 hard coal deposits and 38 brown coal deposits are known to date. In terms of quality, all types of coal exists here, from anthracite to brown coal. Characteristic of this region is the variable stratification with many deposits extending over a large area while others are smashed into smaller individual deposits by tectonic occurrences. The majority of all deposits lie in synclines with stretches predominantly toward the northeast. The coal deposits can be grouped into three groups according to their geological age. The oldest stems from the Upper Triassic (Mongugay Series) and constitutes anthracite and semi-anthracite. The second group, which is of much greater importance, belongs to the Upper Jurassic (Nikansk Series) and to the Lower Cretaceous and contains hard coal primarily. The Tertiary brown coal is reckoned in the third group. However, the age does not always correspond to the quality, since the value of much coal has been changed by tectonic strains. Thus /144/ it comes about, for example, that the Tertiary brown coal of Tavrichanka is very close in quality to hard coal.

Within the coal-bearing Mongugay Series of the Upper Triassic, three independent coal fields are prominent: the Maikhe-Pochikhe deposit, the Mongugay deposit, and the Razdolnaya deposit.

1. The Maikhe-Pochikhe deposit. This deposit lies between the Maikhe River, which flows toward the south into the Ussuri Bay, and the Pochikhe, a left tributary of the Suifun, and is north of the railroad line which runs from Ugol'naya on the Ussuri railroad to Suchan. Best known is the eastern part between the localities of Surazheyevka and Radchikhinsk. The coal-bearing layers here lie in an asymmetrical syncline which extends over an area of 30 square kilometers; these layers comprise an estimated supply of 300 million tons. Only a small part has been explored with the resulting discovery of five productive seams, with a total thickness of 5 to 6 meters. The heating value lies between 8,616 and 8,757 calories. The heavy interlarding /Durchschichtung/ with dead material and the high ash content, however, lower the quality. The western branch of the deposit directly adjoins on the north the Tertiary brown coal deposit of Artem and stretches from the little river Babalyanso to the Pochikhe. Here, too, the coal-bearing layers lie in a syncline, which here, however, is heavily distrubed. Control prospecting locally have shown three productive seams with a thickness of 1 to 3.3 meters. The heating value, which is 7,646 calories, is somewhat less than in the eastern part of the deposit, but on the other hand the ash content is not so great. Some difficulties for exploiting this deposit lie in the complicated tectonic structure. The total supply of the western part is estimated to be 300 to 400 million tons. Mining until now has still not taken place. However, the beginning of mining is foreseen for the near future.

2. The Mongugaya Deposit is in the southwestern part of the area between the coast of the Amur Bay and the Manchurian border, approximately opposite Vladivostok. It is divided into several individual deposits, which correspond approximately to the river basins of the Mongugaya, Amba, and Bira and which contain a total supply of 200 to 250 million tons. Of the eight seams, however, only three are industrially valuable; they have a thickness of 0.5 to 2.0 meters. The quality of the coal is the same as that of Surazheyevka and has the shortcoming that pure coal is found here, too, only in the small central part of the seam. Mining is not done and is also not foreseen.

3. The Razdolnaya Deposit begins at the Razdolnaya station on the Ussuri Railroad and extends toward the northeast as far as the Zuputnika River. In terms of the area covered it is the smallest of the three Triassic coal deposits. However, it is still very little in-

investigated. Natural outcroppings of coal have been determined in numerous places where productive seams up to 1 meter thick are visible but show a sharp fall /starkes Fallen/.

/145/ /Sketch Map of the Coal Deposits in the Vladivostok Area:/

Besides the three large coal deposits of the Upper Triassic mentioned above, supplies of the same age have been encountered in numerous places along the western foot of the Sikhote-Alin', especially also on the right tributaries of the Ussuri. The Boreal Sea which at the beginning of the Triassic period penetrated in a narrow arm from the north into the area of the present-day Ussuri-Khanka depression as far as the extreme south, slowly withdrew again to the north at the end of the Triassic period.(3) In the process the sediments of the Boreal Sea changed from marine deposits to lagoon ones to the continental coal-bearing Mongugaya series, to which the three above-described larger coal deposits belong. Since the deposits of the Upper Triassic extend along the western side of the Sikhote-Alin' in a broad zone, it can be assumed that coal supplies of the same age will also be found further in the north. This is also indicated by the coal findings already mentioned in the area of the right tributaries of the Ussuri; these findings to be sure were made only on geological route surveys.

/146/ The coal deposits of the Upper Jurassic and the Lower Cretaceous have a greater importance than those of the Upper Triassic. In the majority of cases they deliver an excellent fat coal suitable for making gas and coke. The most important and most valuable supplies are concentrated in two large basins: the Suchan Basin and the Suifun Basin.

4. The Suchan Deposit stretches in a syncline with a northeast direction /mit Nord-Ost-Streichen/, and the bulk of it extends on the right side of the Suchan River up to 40 kilometers before the mouth of the Suchan. With a length of 56 kilometers and a mean width of 25 kilometers, the deposit extends over an area of 280 square kilometers. The total supply exceeds one billion tons. Under an unproductive layer consisting of sandstone and conglomerates

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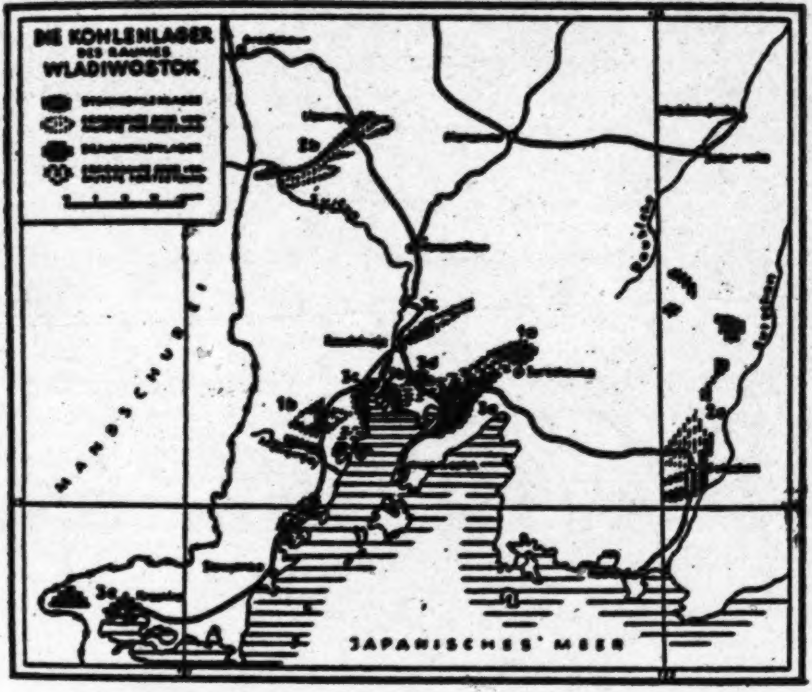
3. Atlas energeticheskikh resursov SSSR /Atlas of the Sources of Energy in the USSR/, Collected work under the editorship of A.V. Vinter, G.M. Krzhizhanovskii, and G.I. Lomov, 2 vols, (Moscow-Leningrad, 1934), p. 7.

Sketch Map of the Coal Deposits in the Vladivostok Area:


DIE KOHLENLAGER
DES RAUMES
WLADIWOSTOK
2b
1b
3c
3d
1a
3a
2a
3e
JAPANISCHES MEER

||| hard coal deposits

⁞⁞ explored or conjectured continuation

☰ brown coal deposits

⁞ explored or conjectured continuation

The Coal Deposits according to their Geological Age:

Triassic: 1 a Maikhe Pochikhe deposit; 1b Mongugaya deposit;
1 c Razdolnaya deposit

Upper Jurassic--Lower Cretaceous: 2 a Coal deposit of Suchan;
2 b Suifun deposit.

Tertiary: 3 a Artem-Ugol'naya; 3 b Tavrichanka; 3 c Fedorovskiy;
3 d Ippolitovka; 3 e Kraskino.

/Konglomeraten/ and extending up to 1, 500 meters on the axis of the syncline, lie three coal-bearing series, which are 300 meters, 150 to 250 meters, and 400 to 500 meters thick. The upper coal-bearing layer contains six seams with a thickness of 0.4 to 6 meters. Within the individual seams the thickness varies greatly; thus, for example, in the second seam from the top, the "Velikan, " the thickness ranges from 0.7 to 6 meters. In the second series are more than eight seams, which in the mean are all more than one meter thick. In the third coal-bearing layer there are four additional productive seams, although their thickness and also their quality declines quickly as they get deeper. The coal deposit of Suchan was already discovered in 1888, and mining was already begun at the end of the last century, primarily in order to supply the Russian navy. As at Suchan, the center of the coal mine, the mining installations to date lie in the southeastern wing of the coal-bearing syncline. In 1933 nine shafts were working. Since then more have been added to these. In the last few years the mining has produced more than 500, 000 tons. Suchan is connected with the Ussuri Railroad in Ugol'naya by an 180-kilometer long branch line. A second railroad leads from Suchan toward the south to the coast and ends at Nakhodka on the bay of the same name. The excellent quality of the Suchan coal assures the area a development rich in prospects, and, with increased production, coal for export is a possibility, especially export to Japan and China, which are not richly supplied with good coke coal.

5. The Suifun Coal Deposit, in terms of the area it covers, is the largest hard coal supply in the Ussuri country. It covers more than 3, 000 square kilometers, and, approximately in the form of a large right angle, extends between the Manchurian border and the Ussuri Railroad. The middle Suifun flows across it on the diagonal. The northern border of the coal-bearing basin is formed by a long Paleozoic granite batholith, which extends under hilly country from Faddeyevka on the Manchurian border via Vladimirovka and Lipovtsy to the east. In the east the basin, in the form of a deep bay, crosses the Ussuri Railroad via Voroshilov /147/ and ends at the Rakovka River, a left tributary of the Suifun. The Yandsogou River can be considered as the conditional southern border, since south of this river the coal-bearing layers are covered over by a continuous basalt covering and the outcroppings of coal are no longer to be determined. The entire coal supply within the Ussuri country is only the eastern spur of a mighty coal deposit whose main part lies in Manchuria and there

135 reaches as far as Kirin--on the Sungari. The diagonal of the Suifun divides the coal basin in Soviet Russian territory into two parts, a southwestern and a northeastern part, and the two parts are sharply differentiated from one another by the character of the relief and also by the degree of economic-cultural development. The southwestern part forms a mountain tableland country with the original basalt covering being divided by heavy erosion into numerous tableland-mountain-like elevations; the coal-bearing layers appear only between these elevations, primarily in the erosion valleys. Because of its remoteness and its slight connection with the transportation system, this area is very lightly populated. The northeastern, left-bank part of the Suifun basis presents an entirely different face in terms of its landscape. It is free of any basalt covering, its relief forms shallow waves, its soil is fertile, its agriculture cultivates predominantly technical plants, and it is thickly settled. In addition, this region is crossed by the Manchurian Railroad, and in the east also by the Ussuri Railroad; the two railroads meet in Voroshilov. Furthermore excellent loam and limestone are diffused in a large measure in this part, and accordingly the industrial opportunities are especially favorable. Tectonically the coal basin represents a broad, rather flat syncline, which stretches from west to east with the incline steeper in the north, while, on the other hand, it is flat in the south. The basin is filled by two series of Lower Cretaceous, of which, however, only the lower one is coal-bearing. More exact knowledge of the stratification is known only for individual areas, where mining is already underway. Thus at Konstantinovka on the Manchurian border, where coal has been extracted since 1888, there is a seam with a thickness of 1 to 2.5 meters, in addition to some unimportant seams. This seam corresponds to the same coal layer of Ilyichevka, Vladimirovka, and Lipovtsy, all three of which lie on the northern edge of the basin, but here the coal layer reaches a thickness of 3 meters and more. On the eastern edge of the basin where coal is mined in a shaft in Nadezhdinsk three to four kilometers east of Voroshilov, two seams, each 3.5 meters thick, are used; in places these two seams merge into a single coal layer. The total supply of the Suifun deposit is given at 4 billion tons. Since all the shafts and prospectings to date have penetrated only into the upper part of the coal-bearing layer and since geologically these correspond to the upper coal-bearing series of Suchan, still larger deposits are expected to be found /148/ at greater depths, and if this conjecture is confirmed, the total supply would be increased two to threefold.

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The quality of the Suifun coal is described as excellent for liquifying coal, and its purity is particularly outstanding. The total amount produced by this mining district is still insignificant and reaches 200,000 to 300,000 tons a year. In this Konstantinovka stands in first place.

The Tertiary brown coal is represented in numerous basins. The most important deposit stretches along the railroad lines to Suchan and extends in a great width from the Ugol'naya branch station approximately 18 kilometers to the east. It covers an area of 180 kilometers and contains several layers with a total thickness of 12 meters. Artem lies in the center of this brown coal region. In coal extracted the Artem area exceeds by threefold the Suchan production of 1938. West of Artem the same deposit is also mined in Ugol'naya and Uglovoye. The total supply is given at 1.5 billion tons. In second place the brown coal deposit of Tavrichanka should be mentioned, which lies on the Rechnoy Peninsula in the northern part of the Amur Bay. The quality comes close to that of hard coal. Approximately 150,000 tons of coal are extracted annually in Tavrichanka, which is connected with the Ussuri Railroad by a 12-kilometer long line. Adjoining Tavrichanka directly on the west is another brown coal deposit, which has six productive seams with a total thickness of 8.20 meters. In the center of this deposit lies Fedorovskiy. Of still greater importance is the brown coal of Ossinovka. This deposit, comprising more than 20 million tons, lies 12 kilometers south of Ippolitovka station, 135 kilometers away from Vladivostok. It consists in the main of a single layer of brown coal, which is up to 19 meters thick and of which a significant portion can be mined in open works without difficulty. The brown coal deposit in the surroundings of the Pos'yet Bay in the extreme southwest is also worth mentioning. Mining also takes place in Kraskino.

Sakhalin

Salkhalin's coal deposits in general have been very little explored. However, the previous determinations justify great hopes. The coal supply lies in three great fields. Best known is the so-called western coal field, which, according to the results of research to date, probably also represents the main supply. It extends along the west coast, lying principally between this coast and the western mountain chain. The coal is of Tertiary age, but because of tectonic stresses it

135 comes close to the quality of hard coal; indeed, according to individual reports, the coal in part is even supposed to be equal in value to the best type of European hard coal. Accordingly, the coal deposits of the Lower Miocene and of the Upper Oligocene, which /149/ the western coal fields consist of, are designated as hard coal in Russian publications, and in terms of its quality the coal is described as gas and coke coal. The coal fields begin approximately 35 kilometers north of Aleksandrovsk, and are divided into more than ten rather large individual deposits, which in most cases lie on the wing of a syncline filled with Tertiary. The value of the individual deposits varies, and both the number of seams and their thickness fluctuates. Thus in the Machinskoye coal deposit, the most northerly, there are seven seams with a total thickness of only 5 meters, while eight productive seams with a total thickness of 20 to 25 meters lie in the Ust'-Agnevo deposit. The geological supply of the western coal fields is given at at least 2.5 billion tons. The mining of these fields began in part before 1931 in individual deposits, for example, in Mgachi, Starovladimirskoye, Arkoza, Makaryevskoye, Oktyabr'skoye, Medvezhinskoye, and other places. By 1933 the total production had already reached more than 250,000 tons a year. Since, however, at that time some deposits were given as a concession to Japan for exploitation, an estimate of 500,000 tons of coal mined at present is not too low. The center of the coal mining region is the already mentioned Aleksandrovsk.

The so-called central coal field should be named in second place; it extends in the depression between the two mountain ridges in the basins of the Tym' and Poronay rivers. Here, too, is Tertiary coal. Nothing is known of the size and supplies of these coal fields since they, too, were only discovered in very recent times. A long and heavily disturbed third coal field stretches in the western mountain range almost parallel to the coast. The coal-bearing layers of this coal field are formed from the Gilyak series of the Upper Cretaceous. This coal area, too, is to date known and investigated only in individual parts; however, the widely-scattered numerous outcroppings in the mountain range permit us to conclude that there is a significant coal supply. Nine productive seams with a total thickness of 10 to 12 meters have been determined in the basin of the Nay-Nay River. In terms of quality the coal here is designated fatty hard coal, but it does have a high ash content.

Considering the great diffusion and mighty development of the

Tertiary on the island, and that geological research is still slight in many cases, it is to be assumed that still other coal deposits will be discovered. Thus, for example, it has been determined that the western coal field continues on the coast toward the north; however, in the process--conditioned by tectonics--the character of the Tertiary coal changes and becomes looser, less valuable brown coal and lignite. 135

The coal deposits on southern Sakhalin will be discussed in detail in the discussion of the island in the second part of this work.

/150/ Kamchatka and the Northern Regions

Extensive brown coal deposits have very recently been discovered on the western coast of Kamchatka; these deposits stretch from the Sopochnaya River in a broad line over several hundred kilometers to the north of Palana. The coal-bearing layer apparently belongs to the Lower Oligocene. The entire Tertiary layer complex is laid in a fault stretching meridionally and is disturbed also in the same direction by breaks. In the upper part of the coal-bearing series productive seams have been found with a thickness of 1.7 to 2.75 meters. The brown coal is strongly bituminous. At Palana, for which which there is more information, eleven seams with a total thickness of 23 meters have been determined. As at Korff Bay these seams change in quality from lignite in the upper layers to better brown coal in the deeper deposits. There is still no mining done here, but mining can become of very great importance for coastal shipping and also for the local fishing industry.

An additional brown coal deposit has been discovered on the west coast of the inner Penzhina Bay. This deposit is supposed to be the same in age and quality as the deposit in west Kamchatka.

Of considerable economic importance even at present are two coal deposits on the coast of the Bering Sea, at Korff Bay and at the mouth of the Anadyr'. The deposits on Korff Bay stem from the Lower Miocene and consist of eleven seams worth mining, with a total thickness of 20 meters. The mean heating value reaches only 4,160 calories. The supplies are numbered at 100 million tons. The center of the mining is Ugol'naya. The brown coal at the mouth of the Anadyr' is divided into three deposits, of which the best known is the one on the little river, the Ugol'naya, which empties into the Anadyr' Bay from the left. This deposit on the Ugol'naya River has two seams which are 1.5 meters and 5.8 meters thick. Here, too, mining is being done

135 which is of greatest importance for supplying shipping. Korff Bay and also the mouth of the Anadyr' are, therefore, especially important bases for the Northern Sea Route.

Total Production. The amount of coal mined in the Buryat Mongol ASSR and in Chita Oblast cannot be given with certainty. The estimate given above of 3 million tons mined in 1950 is considered somewhat high. In the other Far Eastern regions mining is being pushed very hard. By evaluating all reports, it can be assumed with certainty that production has reached a total of 13 million tons. In this the mining in Korff Bay and in the Anadyr' area must be very insufficient, because press reports complain of a coal shortage in the entire area of the Okhotsk coast and in the extreme northeast, with the result that hundreds of thousands of tons had to be transported there from the southern coal districts. How far the Russians have succeeded in /151/ getting the Japanese coal mines in southern Sakhalin back into operation cannot be said. Before the war these mines delivered 2 million tons a year, of which 75 percent was used in Sakhalin itself and only 500,000 tons were exported to Japan.

Petroleum

The search for petroleum on the continent has thus far been in vain, although Tertiary deposits, which could above all awaken hopes, are also widely diffused here. However, these show themselves for the most part to be continental formations. Certain hopes are still placed on the Amur area. Petroleum deposits and supplies have to date only been found on the extreme edge of the Far East--on Sakhalin, Kamchatka, and further in the peripheral north, where the appearance of petroleum appears possible in the Anadyr' depression and parts of the Chukchi Peninsula because of their geological structure.

Sakhalin

The first reports of petroleum supplies on Sakhalin go back to 1880. Investigative drillings began already in 1892. Worthy of mention in this connection is the work of a German by the name of F. F. Kleis, who founded a German-Chinese company and who contributed significantly to the development of the oil area from 1898 to 1914. With the outbreak of the world war he was expelled, and the work was stopped. A Russian and an English company were also working at the same time with him; however, the results in general were of slight economic importance. In 1920 the Japanese occupied the island. They recognized the value of the petroleum deposits and immediately began to exploit them. By 1923 already 1,252 tons had been produced. After the withdrawal of the Japanese, a geological investigation of the island was conducted in 1925 in connection with the petroleum supplies, and at the same time the Soviet Union began the planned exploitation of the petroleum fields.

Natural outcroppings of the petroleum are widely diffused in the eastern coastal plain and extend in a zone from Okha in the north to Okuni in the south. In many places they represent mighty accumulations of asphalt or form tar-like deposits in the so-called asphalt lakes. The bulk of the surfacing is connected tectonically to the continuation of the eastern anticlinal fault of the East Sakhalin mountain range. Natural outcroppings are very rare on the western coastal plain and are known only in the most northerly part near Langry.

The bulk of the petroleum lies under the east coast. Here a total of six deposits can be differentiated; they follow one another from Okha in the north along the coast to approximately the latitude of Aleksandrovsk. The oldest and best known of the deposits is that of Okha. It lies on the western shore /152/ of the Urkt Bay and extends to the south as far as the Gilyako-Bunan River. Here up to sixteen oil-bearing horizons have been determined, of which, however only four in the main deliver oil. The two uppermost horizons are already cut into by erosion and have no economic importance. The third, which lies right under the surface of the earth, has caused the formation of the "Great Asphalt Lake" in a natural outcropping on the Beryakan River; the "Great Asphalt Lake" covers an area of 3 hectares, and the pure asphalt mass has a thickness of 0.5 to 1.5 meters. The upper layer of this mass is hard, but in the summer heat it softens up so much that one cannot enter the "lake." The thickness and also the oil yield of the individual horizons varies from place to place. Only the thirteenth horizon has sufficient gas pressure for a gusher to produce for a short time a quantity of 500 tons per drilling and per day. In addition to oil, natural gas is also extracted in Okha, with the quantity produced per drilling and per day fluctuating between 5 cubic meters and 2,500 cubic meters. The productive drillings in Okha extend down as much as 760 meters.

Approximately 10 kilometers south of Okha lies the center of

135 the next oil field, that of Ekhabi. It stretches between the Gilyako-Bunan and the Khutska Rivers. In the tectonics of the deposit the anticlinal structure of Okha is repeated, but here the deposit is divided into three deposits by cross breaks, which follow one another from north to south. In the last years before World War II the northern part of the oil field of Ekhabi was opened up, and thereby it was determined that Ekhabi is a far richer and more productive field than Okha. The corresponding horizons often produce many times as much as those of Okha. The increase in production is remarkable: it grew from 62,763 tons in 1937 to 165,900 tons in 1938. It is hoped that the extraction in Ekhabi can still be increased and can be maintained for many years. The depth of the drilling in 1938 lay between 650 and 700 meters.

South of the Kydylanya River, which empties into Pil'tunskiy Bay, there begins another oil area, which reaches as far as Chayvo Bay and which usually is grouped under the name Kydylanya-Chayvo-Oil-District. The most important fields from north to south are as follows: Paromay, Pil'tun, Nutovo, Garomay, and Baotasyn. In this oil district the oil-bearing horizons in many cases, lie deeper than those in the Okha and Ekhabi area because of dislocations; but the horizons at the Kydylanya-Chayvo Oil District are connected to the same anticline: only the tectonics become more complicated toward the south. In the southern part there are even two oil-bearing anticlines. In the vicinity of Nutovo there are several asphalt lakes, of which the largest contains 11,000 tons of asphalt. South of the mouth of the Tym' begins the Nyysko-Nabilskiy Oil Region, which got its name from the bays lying on the coast. Here, too, several oil fields have been determined, among which the Katangli field stands in first place. Some exploratory drillings in this field resulted in such a /153/ spurt of oil that extraction was begun in 1937. Four other fields are of industrial importance. The deposits here are connected with two anticlines, with the oil-bearing horizons being the same as those at Okha and Ekhabi.

On the western shore of Sakhalin in the extreme north two oil fields were found, and exploitation here too was begun immediately, because of their favorable location in terms of transportation. The first field, which bears the name Langry, lies 20 kilometers above the Langry River, and the second field lies approximately 15 kilometers to the north on Lake Sladkoye. Both fields belong together tectonically, and both have the same oil-bearing horizons. Here, too, the flanks

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of the anticlines are the bearers of the oil. Langry lies scarcely 100 kilometers away from Nikolayevsk on the Amur, and it is understandable that production in both fields is therefore being strongly pushed.

In contrast to northern Sakhalin, the southern part of Sakhalin, which was Japanese until 1945, appears to have no oil deposits worth mentioning. Although the Japanese employed the most modern research methods here, they only succeeded in finding traces of oil or small supplies, which did not seem worth while to exploit.

Kamchatka and the Northern Regions

Natural outcroppings of petroleum have been known on the east coast of Kamchatka Peninsula since 1913. Explorations, however, have only led to the finding of one oil field. It lies in the northern part of Kronotskiy Gulf, approximately 60 kilometers from the coast in the valley of the little Bogachevka River, from which the oil field got its name. The Tertiary deposits (Oligocene-Miocene) in the Bogachevka area are, however, covered over by a Quarternary lava layer which is 500 to 600 meters thick; the Tertiary deposits come to the surface only at the exit of the valley, where oil-bearing layers are encountered, but only slight quantities of oil and gas are produced by these layers. Exploratory drillings, which have been made within the lava fields by making use of fissures, have indeed brought indications of extensive deposits, but extraction is made extraordinarily difficult and in places impossible by the thick masses of lava and tuff lying over the deposits.

In 1936 oil was found also on the western side of Kamchatka in the area around the village Tigil'. The deposit lies in an area which is more than 20 kilometers wide and 80 kilometers long and which extends along the coast of the Sea of Okhotsk. The village of Tigil' lies in the center. The oil supplies are connected to flat anticlines. The oil-bearing layers are of the Miocene era and have a total thickness of 500 to 1500 meters. The oil is found in sand horizons which are interrupted by dark gray loam, in which /154/ brown coal seams are deposited. These brown coal seams in places attain a thickness of 0.5 to 1 meter.

Additional oil supplies are found in the river basin of the Penzhina and in the hinterland of Korff Bay.

Importance and Exploitation

The importance of oil extraction for the Far Eastern regions of ooo

315 The importance of oil extraction for the Far Eastern regions of the Soviet Union cannot be overestimated. The oil industry supplies the industrial regions in the interior as far as Transbaykal, all ocean and coastal shipping, and also the Far Eastern army. Without the oil of Sakhalin the Far Eastern region would have to import oil from overseas or from the European part of the Soviet Union. In the latter case the oil would have to be brought on the Siberian Railroad over a distance of 7,000 to 8,000 kilometers.

The oil industry in the Far Eastern region is included in the independent trust Sakhalinneft. The oil field at Okha is connected with the oil harbor at Moskal'vo on the western coast of the island by means of a railroad and an oil pipe. From the rest of the oil fields the oil is taken over on the coast by tank ships. Apart from two rather small refineries which are supposed to exist in Okha and in Moskal'vo, the bulk of the oil is processed on the mainland in the oil refineries of Vladivostok, Khabarovsk, and Komsomol'sk. An additional oil refinery is known in Ulan-Ude. Very recently Khabarovsk and Komsomol'sk have received modern cracking installations. The production capacity of the refineries in the two last named cities is estimated to be 1.2 million tons, and the cracking capacity is estimated to be 600,000 to 700,000 tons. An oil pipeline planned and required for a long time, is under construction, or is probably finished at present: it is to bring together all the oil extracted on Sakhalin and conduct it to the mainland to Komsomol'sk and Khabarovsk. The dam completed in 1952 between Sakhalin and the mainland will undoubtedly carry a part of this pipeline. Hassmann (80) reports in this connection that the oil pipe line is to lead from Okha to Nikolayevsk and then along the Amur via Komsomol'sk to Khabarovsk.

The total supply of petroleum in the former Russian part of Sakhalin Island is given at around 150 million tons. (2) /The footnote reference here seems to be in error. Presumably the author meant to

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80. Hassmann, H. Erdöl in der Sowjetunion /Petroleum in the Soviet Union/. Hamburg, 1951.

2. Atlas der Vereisungsverhältnisse Russlands und Finnlands, /Atlas of Russian and Finnish Glaciation Conditions/ Prepared by the Deutsche Seewarte, Issued by the Oberkommando der Kriegsmarine (1942), Vol. II, p. 14.

refer to footnote number 3:--translator/. The total production of Sakhalin Island, including that of the Japanese concession, amounted to 562,000 tons in 1938, but the Russian production, as numerous investigations have determined (59), could easily have been increased if it had not been limited by the shortage of means of transportation. According to the same source (59) the Soviet production in the same year was only around 356,000 tons. According to Hassmann (80), the oil production in the last years after the war developed as follows:

1946	882,000 tons
1947	1,030,000 tons
1948	845,000 tons
1949	1,000,000 tons
1950	1,200,000 tons

One of the last success reports stated that the oil production of Sakhalin in 1952 exceeded that of 1948 by 65 percent. On the basis of the above figures, then, the oil extraction on Sakhalin in 1952 would have amounted to 1,396,200 tons. However, the above figures on the development in the post-war period are regarded as too low, especially the output for 1948 and the following years. Accordingly a total production for 1953 of 1.8 to 2.0 million tons cannot be regarded as being too high.

3. Atlas energeticheskikh resursov SSSR /Atlas of Sources of Energy in the USSR/,//Collected work under the editorship of A.V. Vinter, G.M. Krzhizhanovskii, and G.I. Lomov, 2 vols. (Moscow-Leningrad, 1934), Vol. II, p. 14/

59. Federov, S.F. Neftianyie mestorozhdeniia Sovetskogo Soiusa /The Petroleum Supplies in the USSR/. Moscow, 1939.

59. Federov, S.F. Neftianyie mestorozhdenii Sovetskogo Soiusa /The Petroleum Supplies in the USSR/. Moscow, 1939.

80. Hassmann, H. Erdöl in der Sowjetunion /Petroleum in the Soviet Union/. Hamburg, 1951.

000 as being too high.

Peat Supply

135 The formation of swamps and the formation of peat probably stand in close connection with one another, but the formation of swamps does not always lead to the formation of peat beds. This is in large measure the case in Transbaykal. The irregular water conduction of the rivers brings with it floods and heavy soaking of the ground near the rivers, and accordingly in the valley areas this is often accompanied by swamps. However, only occasionally are peat beds of a larger size found in these swampy areas, and thus Transbaykal has at its disposal only slight peat deposits. Conditions in the other areas are different. The Atlas of Sources of Energy in the USSR gives some figures on this; but these are only general figures, designed to orient; and, as is often emphasized, they should not be regarded as exact data. They are to be used here because they contribute to a clear representation of the land and its conditions. Investigations of individual regions have lead to the general knowledge that of the entire mainland in the Far Eastern region (not including Kamchatka and Sakhalin) around 15 percent is swampy: i.e., in absolute figures, there are approximately 360,000 square kilometers of swamp area. The reason for this extraordinarily high percentage is, in the first place, to be found in the existence of the permafrost, and, in the second place, it goes back also to the extensive tundras in the northeast. Furthermore, research has shown that of the swampy areas, around 10 percent consists of peat swamps which contain peat deposits of economic value. Since from tests and experience in the Soviet Union one reckons on a mean thickness of the peat layer of 1.5 meters, of which, however, only approximately two-thirds can be extracted, one finds that there are extraordinarily large peat supplies in the Far Eastern regions. But these figures should not be considered further, since their value was only calculated theoretically and their realization still lies in the distant future. More important are the peat deposits in the areas already opened, for these have an economic use which is tangible.

In the Aumr and Ussuri region extensive peat deposits are known. They extend primarily in the valley areas around the rivers. In so far as they lie within the food areas, they are economically of slight value because of their great dampness and their high ash content. It is different with the peat deposits which lie on old river terraces or also often

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on the watersheds between the tributaries. These deposits are distinguished by their great thickness and their slight water and ash content. The peat deposits which have formed in the foreland of the mountain ranges have the same character. According to Soviet figures, these types of peat in an absolutely dry condition have a heating value of 4,600 to 5,100 calories per kilogram. In individual regions under morphologically caused conditions true peat massifs have developed covering a large area. The Amur depression below and above Khabarovsk is especially rich in peat deposits of this type. Approximately 80 kilometers below the city, between the right tributaries of the Amur, the Nemptu and the Mukhen, lies an extensive peat massif, which, in the discussions of new plans for this area, is always named in first rank as the basis for energy here, and which for this reason should be characterized here briefly as an example. The peat deposit is divided into five fields with the following dimensions:

Name of the Deposit	Area in hectares	Supply in Millions of Cubic Meters	Possible Capacity of the Power Plants in kilowatts
Mukhenskoye	8,090	61.8	22,500
Nel'tinskoye	1,739	27.5	10,000
Industializatsiya	1,546	17.8	6,500
Amkhalginskoye	15,000	180.0	65,000
Yuskovskoye	10,000	97.5	34,700
	36,375	384.6	138,700

Soviet planners have reckoned that the power plants listed in the above table could in around 25 years reach the designated output by putting in 5,000 hours of work a year. These figures are introduced here only in order to show what economic importance the great peat deposits can have.

There are additional important peat deposits in the area of the lower Amur, in Birobidzhan, then especially also in the area between the Sikhote-Alin' and the Ussuri. The peat deposits in the other regions are still little investigated and are still not included in any plans.

If the large peat deposits are still not being used at present, they nevertheless already form the objects of far-sighted planning, and the /157/ time may come when peat power stations will arise from

135 these peat deposits, such as we see already in action today in the European part of the Soviet Union.

The Iron Ore Supply and the State of Its Exploitation

The iron ore supply of Transbaykal and the Far Eastern region does not constitute a very important percentage in terms of area in comparison with the other parts of the Soviet Union. Transbaykal provides 5 percent of the total area and, according to the state of exploration of January 1, 1938, it conceals in its soil only around 265 million tons of iron ore, not counting iron quarzite. This constitutes only 2.2 percent of the total supply of the USSR. With the Far Eastern regions the difference is somewhat greater; for in terms of area these regions provide 12.5 percent of the total but only 1.6 percent of the supply, which in absolute figures is 187 million tons. In this, however, it is necessary to point out the areas still not completely investigated; the percentage of these in the Far Eastern regions is still especially great, and accordingly there is certainly the possibility of finding new ore deposits.

In the following sections only the most important deposits are to be treated in so far as they are known to date.

Transbaykal

1. The iron ore deposits of Balyaginskoye are undoubtedly the most extensively known and also developed. They form the basis of the foundries of Petrovsk-Zabaykal'skiy, and lie 22 kilometers northwest of these foundries and are connected to them by a railroad line. The ore appears as magnetite in the form of sticks /Stöcken/ and lenses /Linsen/. The iron content is 45.5 percent to 47.2 percent, while the percentage of phosphorus is 0.042 percent and that of sulphur is 0.90 percent. Until recently the mining was still done in open works, but today already it is done in underground works. The ore is broken into pieces on the spot and is enriched by smelting. The supplies are given in the individual categories as follows: A is 2,851,000 tons, B is 288,000 tons, and C is 308,000 tons. The amount of iron ore mined amounted to 113,000 tons annually at the end of the second Five Year Plan. Since because of the completion /of a building/ the capacity of the iron foundry in Petrovsk-Zabaykal'skiy has in the interval been increased to 150,000 tons of crude iron, a mining of from 300,000 tons to 350,000 tons of ore a year can be assumed, and accordingly with

the supplies given above it can be reckoned that the mines will soon be exhausted of ore and the opening of other ore deposits will begin. 135

2. The Balbagarskoye iron ore deposit lies in the Kurba Rayon in the valley of the Kurba River, which comes from the northeast and empties into the Uda approximately 75 kilometers above Ulan-Ude. The deposit begins approximately 60 kilometers from Onokhoy, the next railroad station, and is divided into numerous scattered, individual deposits, which consist of a conglomerate of hematite and /158/ quartz. The total supply of A plus B is 2.4 million tons and of C is 81.7 million tons. Nothing is known about the iron content, but an enrichment on the spot is regarded as necessary.

3. In the Buryat-Mongol ASSR some deposits of iron quarzite have been found, which, according to estimates, should make a total supply of 120 million tons. Of this the largest deposit, that of Mudgor Gorkhonsk, alone has a supply of 96 million tons. Iron ore deposits of secondary importance have also been determined at Mysovsk /now: Babushkin/ in the vicinity of the shores of Lake Baykal.

4. In eastern Transbaykal the most important iron ore deposits are concentrated in the area around Nerchinskiy Zavod. Here lies the often-mentioned Zhelezny' Kriazh, the "Iron Mountain Range," an important iron ore deposit consisting of magnetite. This deposit stretches over 12 kilometers and is supposed to contain a total supply of A to C iron amounting to 112 million tons. The iron content ranges between 40 percent and 60 percent. The ores contain sulphur and arsenic. Forty kilometers from Nerchinskiy Zavod, in the vicinity of the Argun, lies the iron ore deposit of Berezovskoye, which consists of limonites and which has a total supply of A to C ores amounting to 75 million tons. In the same area, whose waters drain into the Argun, additional iron ore supplies have been determined, those of Yakovlevskoye /now: Privolzhsk/, Bystrinskoye, and Beklemishevskoye. According to superficial estimates, the total supply of iron ore in East Transbaykal is assumed to be some hundreds of millions of tons. The remoteness of these deposits, especially the lack of coal which can be made into coke--the next coal district, whose coal, furthermore, can only in part be made into coke, is Bukachacha--makes it appear scarcely possible that the east Baykal iron ore deposits will be used in the near future.

Amur Area

1. The Bureya Mountain Range contains the largest iron ore

135 deposit in the Far Eastern region. In a zone 100 kilometers long, this deposit extends from the Amur to the northeast and lies for the most part in the Jewish Autonomous region. All told ten supplies have been determined, which can be grouped into four groups. The most northerly of these, the Botomskoye iron ore deposit reaches as far as Kimkan on the Amur Railroad. The type of ore varies: in part it comes close to hematite. The iron content is the greatest in the north where it has a mean of 48 percent, and it decreased in the direction of the Amur, where it fluctuates between 34 percent and 43 percent. The total supply of A to C ores is given at 59 million tons. An older figure for the total supply, including the ore in category C_2, was 500 million tons, but this must undoubtedly be greatly adjusted because of more recent determinations; for, according to the research as of January 1, 1938, the total iron ore supply in the Far Eastern region (Krai Khabarovsk and the Maritime Krai) is only 187 million tons.

/159/ 2. At Nikolayevsk on the Amur, lying in the vicinity of the city, are iron ore deposits whose ore has the character of limonite and has an iron content of 26 percent to 45 percent. The supply of A plus B is given at 14.2 million tons, to which 9.5 million tons of category C ore can be added; thus the total supply is 23.7 million tons.

The iron ore deposit of Nikolayevsk is supposed to supply the iron foundries of the combinat "Amur Steel" in Komsomol'sk. Formerly there was a steel plant and a rolling mill there. Since the capacity of the blast furnace envisaged there is planned to be approximately 500,000 tons of crude iron, Nikolayevsk's supplying of this installation will, from the long range point of view, soon lead to difficulties, and accordingly the deposits in the Bureya Mountain Range must in the foreseeable future be drawn into this. There are no further reports on the iron plant originally planned to be built in the vicinity of Kimkan and to use the ore from the Bureya Mountain Range; this plant was to be supplied with Bureya coal from the Tyrma Rayon. But this project must probably still not have gotten beyond the planning stage.

Maritime Krai

1. The magnetite of the Ol'ga group on the coast of the Sea of Japan constitutes the largest iron ore deposit. This magnetite as a rule appears in contact-metamorphic deposits at the points of

contact with lime and granite. This ore is divided into various individual deposits, of which the following three are the most important: Belaya Gora (1,150,000 tons), Magnitny Mys (143,000 tons), and Mramorny' Mys (82,000 tons). The ore of the Belaya Gora deposit has an iron content of 50.7 percent to 58.9 percent and is especially valuable because of its manganese content of up to 2 percent. Additional deposits are on Anna Bay. The general reserves of the Ol'ga Group, including the ore in category C_2, are numbered at 29 million tons.

2. The iron ore deposit of Sudzukhete, in the valley of the Sudzukhe River, lies at a distance of 43 kilometers east of the Suchan coal district. The type of ore varies greatly and ranges from magnetite to brown hematite of the contact-metamorphic type. The iron content ranges between 34 percent and 61 percent. Nickel is also mixed in in places. According to superficial estimates, the supply is given at 1,150,000 tons.

3. At Pos'yet Bay, directly on the coast of the Sea of Japan, 50 kilometers away from Vladivostok, lies another deposit, whose supply, however, is not very significant. It consists of magnetite sand with an iron content of 31 percent to 63 percent and has a total supply of 1.3 million tons.

4. The iron ore of Sergiyevskoye, which lies 7.5 kilometers from the Talovka station on the Manchurian branch of the Ussuri Railroad, is just as favorable from the point of view of transportation as is the Pos'yet deposit. At Sergiyevskoye is magnetite with an iron content of 34 percent to 61 percent and manganese amounting to 0.61 percent to 1.86 percent. The supply, however, amounts to only 280,000 tons of ore in categories A to C.

/160/ Numerous other supplies are known in addition to the above-mentioned iron ores, but these can scarcely be used in the foreseeable future. Up to 1939 mining of iron ore took place only in the deposits at Ol'ga Bay and Sergiyevskoye. Nothing is known of the present state of exploitation, although the thought is suggested that the iron ores lying near the coast may be used in conjuction with the Sakhalin coal which can be made into coke.

Non-Ferrous Metal

Two areas are especially prominent in terms of their supply of non-ferrous metals.. They are southeastern Transbaykal and the Maritime Krai. Zinc and lead with the usual admixtures stand in the

135 foreground in both areas, although in the number of types of metal Transbaykal exceeds the Maritime Krai; for in Transbaykal there is also tin, wolfram, molybdenum, lithium, and others. Copper, on the other hand, is either entirely lacking or it appears in supplies scarcely worth mentioning.

Zinc and Lead Supplies

In terms both of supplies and of production of these two metals Transbaykal and the Maritime Krai have an important position within the Soviet Union. According to Balsak, Chita Oblast and the Maritime Krai supplied the following percentages of the total supply and the total production of the Soviet Union in 1937:

	Zinc Percentage of		Lead Percentage of	
	the total supply	the extraction of zinc ore	the total supply	the extraction of lead
Chita Oblast	7.00	--	10.20	--
Maritime Krai	4.41	11.5	5,54	12.5
Total	11.41	11.5	15.74	12.5

Transbaykal

In southeastern Transbaykal the non-ferrous metals are concentrated in the triangle between the Shilka, the Argun, and the branch of the Transbaykal Railroad leading toward Manchuria. Here, too, are zinc and lead supplies, which appear in the typical mixed ores with the zinc and lead content ranging in the mean between 10 percent and 15 percent; these ores often contain up to 1 percent antimony and between 0.1 percent and 0.2 percent tin. Copper appears only rarely, and then it constitutes only an insignificant percentage of the metals in the ore, while the arsenic content is often larger.

The total number of zinc and lead occurrences is given at 550, of which, however, only 34 have an importance realizable /161/ economically, i.e., industrially. These occurrences can be grouped into five mining districts according to their geographical position; in these districts are old works already established in the Czarist era.

1. Rayon Aleksandrovskiy Zavod. This comprises five deposits, of which that of Akatuyevskoye is the most important. The ore here

appears in extensive veins. The content of lead (2.85 percent) and of zinc (1.88 percent) is slight, but the silver content, whose mean is 275 grams per ton, made use of this ore feasible economically in the past. The total supply in the rayon is in 1,000 tons:

Category	Ore	Zinc	Lead
A_2	71.3	1.8	1.8
B	270.8	7.0	8.5
C_1	258.6	6.7	7.2
Together	600.7	15.5	17.5
C_2	292.5	8.0	10.5

2. Byrkinskiy Rayon. Like the above mentioned rayon, this lies in the south, approximately east of Borzya, and it comprises five deposits. The most important of these lies at Savinskoye and was exploited by the mine of the same name. The ore here constitutes a stratum-type formation, which comes to the surface in a width of 600 meters and which has a thickness of 15 to 20 meters. The content of lead (4 to 6 percent) and of zinc (4 to 7 percent) is not very important, but extraction is very much facilitated by the favorable stratification. The total supply of the rayon is in 1,000 tons:

Category	Ore	Zinc	Lead
A_2	1,600.0	42.2	27.4
B	609.9	28.4	23.0
C_1	3,530.0	166.8	73.5
Total	5,739.8	240.4	123.9
C_2	458.8	18.7	13.5

3. Rayon Gazimurskiy Zavod. This comprises only two deposits with insignificant supplies. In the Tayninskoye deposit the ore is connected in veins, which appear in dolomite lime. Earlier these deposits supplied the Gazimurskiy plant. The total supply in 1,000 tons is:

Category	Ore	Zinc	Lead
C_1	40.0	4.0	2.0
C_2	180.0	17.6	9.2

4. Rayon Nerchinskiy Zavod. Here twenty deposits press together in a narrow area along the Argun to the north and south of the old,

135 well-known works. /162/ These deposits are in part exploited by the Nerchinsk Works and are therefore the best known. The most important deposits are those of Mikhaylovskoye and Kadainskoye. In the first of these the ore forms stratum-like veins deposited in limestone; in the Kadainskoye deposit, on the other hand, the ore appears also in extensive beds. In addition to zinc and lead, cinnabar is also extracted in Nerchinskiy Zavod. The total supply of the rayon in 1,000 tons is as follows:

Category	Ore	Zinc	Lead
A_2	548.0	84.6	37.0
B	426.5	43.8	20.8
C_1	899.1	60.8	41.1
Total	1,837.6	189.2	98.9
C2	2,655.2	205.0	134.8

5. Ustkariyskiy Rayon. This comprises only two deposits, Yekaterininskoye and Preobrazhenskoye, in which only oxidized ores are mined and which are processed in the Shilkinskiy Zavod. The supply contains only ores of category C_2 and amounts in 1,000 tons to: ores 1,050.0; zinc, 34.5; and lead 23.5.

After the Bolshevist revolution work in almost all the installations was stopped because it didn't pay. In the last few years a large zinc-lead combination has been erected in Nerchinskiy Zavod. This combination depends on ore deliveries from thirteen mines, which are grouped into three bases. Nothing is known about the production or its size.

Maritime Krai

The zinc and lead occurrences here are limited to a narrow area extending approximately 150 kilometers along the coast of the Sea of Japan, from the point where the Pkhussun empties into the sea in the south to the river area of the Tetyukhe in the north. All told more than 50 occurrences have been determined, of which, however, only fourteen justify economic exploitation. The most important deposits are concentrated in three groups, of which the most northerly lies in the river area of the Tetyukhe, the central one lies between Vladimir Bay and Ol'ga Bay, and the most southerly lies in the area around the mouth of the Pkhussun. The Tetyukhe group is of outstanding importance, having more than 90 percent of the total supply

135

in the Maritime Krai. These are contact-metamorphic deposits having contact with quartz porphyry and lime in the form of great beds and lenses /Linsen/, which appear both in the main valley of the Tetyukhe and also in the neighboring valleys. The content of zinc and lead in the deposits in the Maritime Krai is as a rule higher than in the deposits in Transbaykal, and in addition silver generally appears in the Maritime Krai too. In this connection attention should also be paid to the deposits on the Great and the /163/ Lesser Sinancha in Terney Rayon, approximately 35 kilometers north of the mouth of the Tetyukhe. Even though the total supply here is not very great, this deposit is distinguished by its very high values; for it contains 23.5 percent zinc, 15.1 percent lead, and 462 grams of siver per ton of ore, while the silver content in the Tetyukhe deposits as a rule does not exceed 280 grams per ton. The total supply of the Maritime Krai is as follows in 1000 tons:

Category	Ore	Zinc	Lead
A_2	804.4	79.1	63.1
B	2,121.6	220.5	99.7
C_1	1,436.4	115.8	47.6
Total	4,362.7	415.5	210.4
C_2	1,974.9	114.8	73.2

The Tetyukhe deposits were already discovered by the Chinese in the forties of the last century. From 1911 to 1919 the Vladivostok wholesale merchant, Briner, worked here, who in 1915 created a concentration installation. In 1924 the mine went as a concession to the British "Tetyukhe Mining Corporation." In 1928-29 there were 55,000 tons of ore mined from here, and from this ore 14,000 tons of zinc concentrate and 6,000 tons of lead concentrate were extracted through flotation. In the first half of 1930, 74,000 tons of ore were mined, to produce 14,000 tons of concentrate. After the installations were taken over by the Soviet regime, two additional mines (Sovetskiy Rudnik No. 1 and 2) were established in the vicinity of the old mine. The amount of ore mined can be reckoned at 85,600 tons for 1937 and at 108,100 tons for 1938. There are no data whatsoever on the further development of these installations.

The concentrates or metals extracted are transported to the harbor installations at the mouth of the Tetyukhe with the help of a 35-kilometer long narrow-gauge railroad line. From the south of the Tetyukhe these concentrates and metals are carried away by the sea route.

Other Resources from the Ground

135 Copper. Eighteen occurrences are known in the Maritime Krai, but of these only two are worthy of mention, those in the area of Plastun Bay and on the Yaudsukhe emptying into the Dzhigit Bay. The copper content of the ore tests ranges between 5 percent and 8 percent, but as a general mean it is only 1.5 percent, and accordingly economic exploitation appears scarcely possible. The results of research on the Chukchi Peninsula awakened great hopes of copper and other non-ferrous metals, for copper ore has to date been found in five places on this peninsula. All figures indicate a considerable wealth on the Chukchi Peninsula, but nothing has been made known about the type of ore occurrences and their supplies. (See sketch map on p. 164)

/164/ / Sketch Map of the Copper Occurrences on the Chukchi Peninsula/

Tin. Up to the beginning of the second Five Year Plan (1933) Chita Oblast was the sole tin-producing area in the Soviet Union, and even now this region remains decisive in supplying the Soviet economy with this valuable metal. The most important deposits are in the river area of the Onon in southeastern Transbaykal, where four independent deposits have been determined. These deposits extend over an extensive area. The tin content ranges between 0.17 percent and 3.78 percent; the mean, however, it only 0.6 percent to 1.0 percent. The tin is extracted in the works at Khapcheranga and Sherlovogorsk and in the Onon Mine, not far from the Olovyannaya railroad station. A new mine has been established at the foot of the Sokhondo. In production the works at Khapcheranga stands in first place; in this it is aided by the fact that coal lies in the vicinity, which is mined for running the plant. In the Maritime Krai tin is found in the region of the Bol'shaya Sinancha, which has already been mentioned for its zinc and lead ores. At the end of the thirties mining was begun here.

Wolfram is found in the Buryat Mongol ASSR along with molybdenum in the river area of the upper Dzhida, where there is a great works with its center in Gorodok. The plants are equipped with a dressing installation and with conveying railways and suspension railways. The work is favored by the existence of coal, which is extracted not far from the plants. The wolfram deposits of Dzhida are regarded as the largest in the Soviet Union. In Chita Oblast wolfram is furnished by the deposits at Belukha and Bukuka, which are east of the Olovyannaya railroad station. Additional deposits have been found

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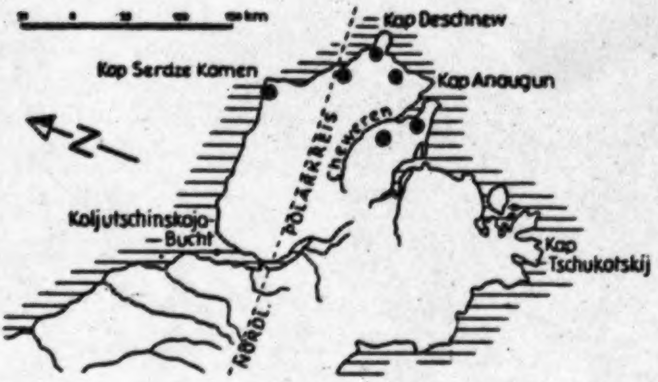
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Sketch Map of the Copper Occurrences on the Chukchi Peninsula in the valley of the Chikoy, but these have still not been opened up. 135

Molybdenum is extracted in Gutay on the Chikoy River in the Buryat Mongol ASSR. Occurrences of molybdenum also appear in the /165/ Amur region and in the Maritime Krai. Only a deposit on the upper Bureya has proved to be industrially useful to date. A works for extracting molybdenum and antimony has been erected in the last few years where the Bureya's right tributary, the Umalta, empties into the upper Bureya. The Bureya coal lying in the same area facilitates the work.

Fluorspar is mined in southeastern Transbaykal in six mines. The largest of these are the mine of Kalenguy, in the vicinity of the Khada-Bulak station, and that of Solonechnoye in the Argun River area. Up to 1937 Transbaykal provided 85 percent of all the fluorspar in the Soviet Union. The supply of feldspar is given at more than 1.2 million tons.

Bauxite. A significant deposit of bauxite was discovered south of Lake Baykal at the locality of Okinsk. In 1947 mining was begun, and at the same time an aluminum plant was erected in Okinsk. Another large bauxite deposit has been determined in the Eastern Sayan at Sagakhani-Eshen.

Among the other mineral resources of Transbaykal the deposits of lithium should also be mentioned. According to Soviet figures these should be reckoned among the most important in the world. Various deposits of natural soda should also be mentioned. Furthermore, there are reports of occurrences of asbestos and graphite. There are reports of uranium findings only from the extreme southwest of Transbaykal.

Only the most important minerals could be listed above, and at that they could only be described in so far as they represented industrially valuable deposits or were already being exploited. Striking in this connection is the inadequate connection with the transportation network, especially with the railroads. For even those production places so emphasized in Soviet literature for their economic importance--such as these on the upper Dzhida or Khapcheranga and many others--have no railroad connection to the rest of the transportation network, but rather as a rule are connected only by finished land routes, which, to be sure, can be traveled by trucks the whole year through. Herein lies a restricting factor, which is effective in numerous mining places and which does not allow these places to come to their full development despite the generosity of their installations and plans.

Gold

Without a doubt it can certainly be assumed today that within

135 the gold economy of the earth the Soviet Union can claim for itself one of the first places among the producing countries. From the most varying announcements and other sources it can be concluded that the Soviet Union is striving with all its force and all its energy to expand its gold mining without considering cost problems. However, the results of the gold extraction /166/ has been kept as a strict state secret for a number of years. Absolute silence is also kept on the share of the individual regions in the production, and accordingly exact figures cannot be expected on this subject. But it remains certain that the regions treated in this book continue to include in themselves the most productive gold areas in the USSR, even though the Soviet press occasionally reports the development of new gold fields in other regions. As the best example, the Kolyma area should be pointed out here: it was opened up from Magadan on the Sea of Okhotsk out and has brought the Soviet Far East again into the foreground as a supplier of gold.

In the following description all the gold production areas are to be treated in a clear summary indicating how they have been presented in publications of the Soviet Union both before and during the last war and how they are directed and taken care of by state administrative agencies up to this time. It is scarcely to be assumed that they have been abandoned in the time which has passed since then. In some of the areas newer sources are also used.

In the Buryat Mongol USSR /sic/ the Vitim Plateau is still a productive gold area, which for a long time has belonged to the primary productive areas of Siberia. From the gold streams the gold is extracted with the help of modern dredges /Draggen/ and hydraulic machines. The center of this gold area is Tsipikan, which is connected with Chita by an airline, which is flown regularly. This advances the importance of this area, and furthermore makes it possible that the mining here is directed and controlled by five gold mining administrative agencies.

In East Transbaykal the gold is extracted in numerous places which are, however, more scattered. The gold fields here have been known since the end of the eighteenth century and for the most part they have already become unproductive. Only the remote river valleys are still of significance; for example, the area around the upper course of the Tura (a tributary of the Ingoda) and of the Ilya (a tributary of the Onon), the valley areas of the upper Chita and Uldurga, and, to a lesser extent, some tributaries of the Argun. Accordingly they have moved on to exploiting gold, which has been discovered in the valleys of the Ingoda, Shilka, and the Chikoy. For this, modern gold ore works have been founded. The most important ones lie in Darasun, approximately 75 kilometers northwest of Nerchinsk, and in Baley in the valley of the Unda, approximately 40 kilometers south of Nerchinsk. In both of these arsenic and other metals are extracted at the same time. 135

The Amur gold fields should be named in third place. They extend over an extraordinarily large area and for this reason are divided into three parts: the Amur-Zeya area, the Selemdzha area, and the Bureya Mountain range.

/167/ The Amur-Zeya area comprises all the gold fields in the sphere of the rivers flowing into the upper Amur, including the Zeya. Some districts are especially prominent here, for example one to the north of the Mogocha station where the valleys of the northern rivers flowing into the Amazar conceal in themselves productive gold streams. Also subordinate to this administrative district are the neighboring gold streams of the rivers flowing toward the north to the Tungir. A second district lies to the north of the Skovorodino station. Here primarily the gold streams of the area around the upper course of the Urusha, of the Oldoy, and of the Urkan, which flows into the Zeya, are processed, in so far as they lie north of the Amur railroad. The areas around the lower courses of the numerous Amur tributaries between the railroad line and the Amur River have already become unproductive since gold washing had already begun in these valleys in 1867. Judging from the number of gold mining administrative agencies--before the war there were four--this district in the Skovorodino area must be very productive. To this district there also belongs the area around the upper course of the Nyukzha, which flows toward the north to the Olekma. While only gold streams are exploited in the above-mentioned areas, in the Zeya district mine gold is represented in rich measure in addition to gold streams. This district encompasses the entire depression between the Stanovoy in the north and the Tukuringra Mountain Range in the south. A base is formed in the eastern part of the southern slope of the Stanovoy in the area of the right tributaries of the Zeya: Sugdzharikan, Bomnak, and Tok. The administrative center here is Mikhaylo-Semenovskiy. Also equally rich in gold is the western part of the depression in the sphere of the right tributaries of the Zeya, the Ushuley, Bryanta, Unakha, and along the entire course of the Gilyuy. Two administrative centers here serve as executive offices for the plants. In general only gold streams are exploited, but in many places here they move on to working the gold-bearing sands lying under the surface of the earth; these sands are brought to the surface in mining-type

135 processes. In addition mine gold also occurs in this region, especially in the Gilyuy area where a mountain especially rich in gold veins has the name "Gold Mountain." However, there are no reports that mine gold is being mined on a large scale here, and, furthermore, these regions are still too little opened up in terms of transportation.

The Selemdzha gold area extends over only a slight area and comprises in the main the gold streams of the tributaries coming from the Dzhagdy Mountain Range to the upper course of the Selemdzha. These tributaries are also only rich in gold in the area near their sources, but, on the other hand, in the drainage area of these tributaries they are rich in primary deposits, which are exploited here on a rather large scale, but mostly with very primitive methods. The administrative center is Karaurak, a second center lies further up in the valley of the Khargy, a left tributary of the Selemdzha.

The gold deposits of the Bureya Mountain Range are insignificant and are remote, lying in the area around the source of the Niman, a tributary of the upper Bureya. The /168/ gold district is subordinate to only one administrative agency, which is in Sofiysk.

Next to the above-mentioned gold districts all others in the area of the Amur-Ussuri region and also in the Maritime Krai are of subordinate significance. Only those districts should be named here which are grouped in a gold mining administrative agency: thus, the gold district in the valley of the Sutar with its center in Radostny' in the Jewish Autonomous Region and three gold fields west of the lower Amur, in the area of the area of the Amgun and Kerbi rivers and north of the Orel Lake. On Sakhalin there is a corresponding district only south of the upper Poronay. In Kamchatka and in the entire coastal area the extraction of gold is scarcely worth mentioning.

In contrast to the reduction in importance of the above-named areas, the Kolyma area has in the last few years stepped into the center of interest almost with a jump. Today it exceeds in productivity all the other gold districts both in the Far East and also in the whole of the Soviet Union.

The first reports of gold occurrences in the area of the upper Kolyma go way back, and there were also reports on Cherskiy. However, only the successful expedition of the Central Institute for Scientific Research and Geological Inquiry, under the leadership of Bilibin, whose report was given in 1932, caused the Soviet Union to proceed to the exploitation of the gold fields in 1933. The first successes and the knowledge of the wealth of this region were spurs to pushing recklessly 135 forward in the exploitation by using work camps. As a consequence, the Kolyma area today is among the most notorious regions in the Soviet Union, and is one of those most feared, because of the harshness of its climate.

For the opening up of this area building was done on the harbor and city of Magadan on Nagayevo Bay. The inhabitants of this city today are estimated to be 50,000. A highway was laid out to connect [491] with the gold fields; by 1940 this highway had already attained a length of more than 700 kilometers, and it connected all the important mining centers. The road is kept usable for trucks the whole year through. The supplying of the entire area is done via the sea route, for the most part via Magadan, and for the rest from the north via the Kolyma. Since these connections, however, are closed off by ice for more than six months during the long winter, they proceeded to create a permanent land connection by building a highway from the center of the gold district to Yakutsk on the Lena. Of considerable importance for the development of this regions is also the fact that hard coal has been found on the Kolyma in the vicinity of the town of Verkhne-Kolymsk. Some Sovkhoz have been founded as a local source of supply for vegetables, milk, and fresh meat.

The main gold fields lie west of the Buyunda, a /169/ right tributary of the Kolyma, primarily in the area of the Srednikan and Orotukan rivers. At first only the very productive gold streams were exploited, but then the mining of mine gold was also taken up. Mine gold is especially rich in the mountains on the Srednikan, on the Utina, and on the Khatynakh. The most important centers of the gold district are Srednikan, Orotukan, Khatynakh, and Seymchan.

Gold extraction in the Kolyma region developed as follows in 316 comparison with the total production of the Soviet Union (Figures are 433 in 1,000 kilograms):

	1933	1934	1935	1936	1937	1938	1939
Soviet Union	83.0	120.0	149.0	163.0	176.0	192.0	210.0
Kolyma Region	0.3	1.2	8.0	12.3	20.0	30.0	51.0
Percentage of the whole supplied by the Kolyma Region	0.4	1.0	5.4	7.5	11.3	15.6	24.3

(Table continued on following page)

	1940	1941
316 Soviet Union	225.0	240.0
433 Kolyma Region	51.0	55.6
Percentage of the whole supplied by the Kolyma Region	22.7	23.2

The share of the Kolyma region has risen to almost 25 percent of the total extraction done in the Soviet Union. According to definite plans, gold production in the Kolyma area is to be raised to 75,000 kilograms. Friedensburg, in his book on "Gold" which appeared recently, has collected together in a table of figures (63) all estimates and reckonings on the total gold extraction in the Soviet Union. With justice he points out the confusion that rules on this question even in foreign agencies versed in such affairs. Nevertheless, I do not shy from bringing the above table which rests on my own sources. The present production may be assumed to be approximately 250,000 kilograms (1952). In any case, it is certain that the Kolyma region stands at the head of all gold fields in the Soviet Union. According to the supplies explored, mining is assured for 15 to 20 years if the extraction remains at 75,000 kilograms.

The Forests and the Use of Wood

311 The forests of Transbaykal and of the Soviet Far Eastern regions are, by European standards, as large as countries. The forested area covers around 1,800,000 square kilometers. While the Far Eastern regions contribute around 17.5 percent of the total area of the USSR, these regions provide 21 percent of the total forested area.

The distribution and extent of the forests in the Soviet Far East are shown in the following table:

(Table on following page)

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63. Friedensburg, F., "Gold," Die Metallischen Rohstoffe /Metallic Raw Material/, Vol. 3, 2nd edition (Stuttgart, 1953), p. 178.

Region	Forest Area in millions of hectares	Percent of the total area	Area stocked with forests in millions of hectares	Percent of the total area
Buryat-Mongol ASSR	28.7	84	18.7	57
Chita Oblast	57.6	80	43.2	60
Far Eastern Regions	104.2	37	58.9	21
	180.5		120.8	
USSR	956.3	44	484.2	23

/170/ Transbaykal can be designated as rich in forests although it includes extensive steppes. The forest area or the forest potential, as the Russians designate it, is given at 28.7 million hectares (1936) in the Buryat Mongol ASSR; thus the wooded area covers more than 84 percent of the total area of this republic. However, this total figure of 28.7 million hectares (100 percent) also includes the pastures and meadows closed in by forests (6 percent), and, in addition, the swamps, the bare peaks of the gol'tsy, and boulder areas little grown up (13 percent), and thus only 23.3 million hectares (81 percent) remain for forests themselves. Of this, again, only 18.7 million hectares (65 percent) are stocked with forest, i.e. real, tall forests. Burned areas, windfallen trees, and other things account for the significant difference between the two last figures. These figures show the actual conditions, indicating how one must view in their individual parts the areas designated as general forest potential in the statistical information. These figures also serve at the same time to explain the above table. The percentage of forest is largest in the northern areas, especially in the mountains which surround Lake Baykal, and it is smallest in the south, especially in the area around Kyakhta.

According to types of trees, the stocked wooded areas are divided as follows:

Conifers: 93 %, with	larches	47 %
	pines	24 %
	cembra pines	16 %
	spruces, firs	6 %
Deciduous trees: 7 %, principally	birches, aspen, poplars, and others	7 %

311 137 Approximately 65 percent of the forests consist of wood ready for cutting, i.e. the trees are over 100 years old. These and the above figures should be regarded as only estimates; for a large part of the forested area has neither been investigated nor has a count of the supply in the forests been made. What large tasks are still to be resolved here and also in the other Far Eastern regions is shown by the figure given by V.F. Panayev for the year 1936: he said that at the time only 18.4 percent of the total forested area in the Buryat Mongol ASSR had been explored. (12)

12. Problemy Buriat-Mongolskoi ASSR /Problems of the Buryat-Mongol ASSR/, Works of the First Conference for Exploring the Productive Powers of the Buryat-Mongol ASSR, 2 vols., (Moscow-Leningrad, 1935-36), Vol. II.

313 The use of the wood is determined in terms of area by the development of transportation. The exploitation of the forests is limited to the area of the Selenga and its tributaries, which carry down the cut wood for the most part to Ulan-Ude or Il'inskoye for processing. The forests are also exploited in the regions near the shores of Lake Baykal, where wood processing industries have arisen at the mouths of the Barguzin and of the Upper Angara. The most important plant in this area is in Mysovsk /now: Babushkin/, where a great lumber works with sixteen saw sashes is situated /saw frame/. The railroads should also be mentioned as the last supplying line for exploiting /171/ the forests, while all the remote forests still remain in their natural state.

311 313 In Chita Oblast the forest conditions are similar, but here the percentage of actual forest is somewhat greater than in the Buryat-Mongol ASSR. The exploitation of the forests is limited to the regions near the railroad and to the areas neighboring on the Amur and its tributaries. The main processing centers are Chita, Khokhotuy, and Bada.

311 The percentage of forested areas in the other Far Eastern regions appears slight, being 37 percent for the forested areas and 21 percent for areas actually stocked with trees. This is explained by the fact that to these regions also belong the areas of the northeast, such as the Chukchi and Koryak peninsulas, the Okhotsk coastal area, and Kamchakta, which in part are completely without forests or have only slight forests. This is also explained by the great difference between the general forest potential (104.2 million hectares) and the area stocked with forest

(58.9 million hectares). If we set the general forest potential at 100 percent, then, according to the Atlas of Sources of Energy in the USSR, there should be subtracted from this 1.1 percent for meadows and pastures (1.1 million hectares), 24.7 percent for swamps, bare rock, and boulder slopes which are only slightly grown over (25.8 million hectares), 17.7 percent for bush growth areas, burned areas, windfallen trees, and other (18.4 million hectares), and thus 56.5 percent (58.9 million hectares) remain for the areas stocked with forests. 311

The bulk of the forests are thus divided between the south, i.e., the Amur and Ussuri regions, and the Maritime Krai. This is of very great economic importance, because these forests are thereby closer to the reach of man. In these areas the percentage of forests to the total area is also much greater than the general average. Thus, for example, the percentage of forest land in Khabarovsk Oblast is 66 percent, in the Maritime Krai it is 51 percent, and in the Amur Oblast it is 37 percent. The Oblast of the Lower Amur (28 percent) and the Zeya area (25 percent) have the smallest percentage of forest area here. Sakhalin is among the areas richest in forests. In northern Sakhalin the percentage of forest area is 66 percent, and in southern Sakhalin which was formerly Japanese, it even reaches 85 percent (2.9 million hectares).

The stocked forest areas (not including southern Sakhalin) are divided among the various types of trees as follows: 311 137

Conifers:	84 %, with	larches	36 %
		spruces	27 %
		cembra-pines	12 %
		pines	8 %
		firs	1 %
Deciduous trees:	16%, with	birches	9 %
		oaks	4 %
		lindens	2 %
		ashes, aspens	1 %

The deciduous trees in particular increase toward the south, and accordingly, in comparison with the general averages given in the above table, the percentage of valuable deciduous trees in the Ussuri region and in the southern part of the Maritime Krai is much larger.

The supply of wood in the Far Eastern forests is also larger in comparison with Transbaykal, for in the Far East 70 percent to 80 percent of the trees are ready to be cut down. The total wood supply in the

311 forests here is estimated to be 6.5 billion cubic meters, of which 5.4
137 billion cubic meters consist of coniferous wood.

The entire river network of the Amur, with its numerous tri-
313 butaries which are navigable by ships and rafts, facilitates the exploitation of the forests, and accordingly a significant wood industry has been able to develop in the Amur and Ussuri regions. Khabarovsk and the surroundings are regarded as the base of this industry. From there the bulk of the wood-processing industry extends to the south, following the leading line of the Ussuri and always lying on the tributaries of the Ussuri. Here, from north to south, lie the wood centers of Khor, Dormidontovka, Bikin, Lesopil'nyoye, Lesozavodsk, and Vladimirovka. Another base for the wood industry is formed by Vladivostok and its environs with the towns of Okeanskaya, Shkotovo, Lukyanovka, and Tigrovka. Sovyetskaya Gavan' has very recently become the most important wood-processing center on the coast of
[289] the Sea of Japan. Komsomol'sk has received a large works for producing cellulose and paper. Aleksandrovsk on Sakhalin and Petropavlovsk on Kamchatka have in the last few years also been equipped with wood-processing plants.

The total amount of wood cut has increased significantly in comparison with the period before World War II. According to careful estimates, the amount of wood cut during the year of 1952 can be assumed to be 5 million cubic meters in the Buryat-Mongol ASSR, 6 million cubic meters in Chita Oblast, and 30 million cubic meters in the other Far Eastern regions. Considering all the circumstances, this estimate is more likely to be too low than too high.

313 The Soviet Union has acquired an important supplement to its wood economy by its acquisition of southern Sakhalin. The Japanese
289 had built up an excellent wood industry, which before the war consisted of 68 saw mills and 11 large cellulose and paper factories. Karafuto exported annually to Japan more than 1.2 million cubic meters of wood and many times the value of this wood in cellulose and paper. What importance the wood-processing industry had for the economy as a whole is indicated by the industry's share, in terms of value, in the total production of Karafuto. The share of industry in Karafuto's production was approximately 60 percent, and of this 60 percent the cellulose and paper factories alone provided around 90 percent, and the entire wood-processing industry 92 percent. All this now stands at the disposal of the Soviet Union.

Power Economy

Available as sources of energy are above all the known energy materials such as coal, oil, peat, and wood, and, in second rank, water power. Coal has a prominent position in terms of its share in the present production of energy. Oil claims second place. Peat and wood play a very decisive role only in certain places, while a beginning has been made only in the last few years in the exploitation of water power. More exact figures on the economic contribution of the various sources of energy cannot be made since no publications are available on this subject. This applies also to the production of electrical energy, which is to be treated next, and about which only a generalized picture also can be drawn. 371

In its numerous coal deposits, which are scattered widely over the land, Transbaykal has the best conditions for supplying itself regionally both for industrial purposes and also for the production of electrical energy. Here, too, the first modern beginnings were made in moving the production of electrical energy into the coal areas themselves and transporting the current instead of the coal to the centers of consumption. The steam power plant of Tomcha must be named here in first place: it is based on the coal of Lake Gusinoye and was built a few years ago in the vicinity of the railroad line from Ulan-Ude to Naushki. It has the task of supplying electricity to the wolfram mines, and it is assumed than an overland line leads into the regions of the upper Dzhida. The coal deposits of Kholbon also have an older power station (around 10,000 kilowatts), which also supplies both the city of Nerchinsk (over 25 kilometers away) and the gold works of Darasun (60 kilometers away) and of Baley (50 kilometers away). Power stations have also been erected in the coal deposits of Bukachacha (around 9,000 kilowatts) and of Kharamangutsk (around 3,000 kilowatts); these power stations, however, only serve the mining installations on the spot. All the larger cities and also the more important localities on the railroad line have their own heat power stations; coal must be hauled to these stations over a more or less long distance. For Ulan-Ude and Chita, which have the largest installations, there is the peculiar picture, arising out of the historical development, that both cities have several power stations where the capacity of the plant-owned power stations, which were built later, exceeds that of the older power stations which supply the cities' needs. In Ulan-Ude, for example, the power station of the locomotive factory (27,000 kilowatts) exceeds the city power station by several fold in 377

377 indicated power. Chita has five power stations with a total capacity of around 50,000 kilowatts; these power stations are driven by coal from Chernovskoye. Only the railroad repair shop has built its power station in the coal district itself. Petrovsk-Zabaykal'skiy has its own power stations. While all the above-mentioned power stations use coal as their heating material, the plants lying at a distance /174/ from the railroad line, such as, for example, the non-ferrous metal combinat, employ mixed firing, using peat and wood of local origin. The use of water power has in general still not gotten beyond the stage of research and planning. In 1948 the first water power station was erected on the Kyngorsk waterfall, but this power station is only of a limited size and is destined to supply agriculture only. There are reports from various regions of the erection of this type of small power station of the framework of sovkhoz and kolkhoz.

In the Amur area we find approximately the same picture. All the larger localities have their own power stations. Energy networks do not exist, and accordingly the individual central power stations, apart from Raychikhinsk, have to be supplied with energy materials from outside. Since the coal deposits here are smaller in number and are much farther from one another, the supplying of the stations is more difficult than in Transbaykal. Accordingly, the power stations employing mixed firing constitute the great majority. Here in the Amur country such plants also exist in the localities along the railroad line. In addition to coal, wood and--the farther one goes to the east--oil also are used. Some localities such as, for example, Birobidzhan, even have electrical works which are based only on oil. In general, however, coal predominates, with the greater part of the Amur area dependent on the import of brown coal from Raychikhinsk. In terms of transportation, the localities north of the arc of the Amur are most unfavorably situated, for the next coal area which comes into question as a source of supply, lies more than 700 kilometers away. It is therefore understandable that mining of a new coal field has begun at Magdagacha, which is more favorably located in terms of transportation. The power stations of Svobodnyy (around 5,000 kilowatts) and of Kuybyshevka (3,000 kilowatts) employ mixed firing, while that of Blagoveshchensk (25,000 kilowatts) uses coal. The coal area of Raychikhinsk supplies itself with energy as well as the industrial localities of Zavitaya and Bureya, which are not insignificant, although these two lie only about 40 kilometers from the coal center. Khabarovsk has five power stations, of which the largest, with its more than 10,000 kilowatts of installed power, serves to supply the city. The others are installations owned by plants (each station has a capacity of approximately 4,000 kilowatts). An extension of the power installations gives the prospect of raising the total capacity of Khabarovsk to 50,000 kilowatts. The most important power station in the Amur area (45,000 kilowatts) is in Komsomol'sk. Another power station is under construction there. Nikolayevsk on the Amur also has a very important power station which supplies the industrial installations in the environs, too. The use of the water energy so abundant in the Amur area is still in the beginning stages. A larger water-power station is supposed to have been built between Khabarovsk and Komsomol'sk in the years after 1947; this station was to serve as supplement for these two cities. However, nothing is known of the station's location or /175/ output. Water power is used more extensively in the building of small, country power stations within the framework of kolkhoz and sovkhoz or groups of these. In 1950, for example, a larger power station was built to supply four kolkhoz. While in 1950 the state of electrification in the Amur area was still designated as insufficient, it appears that since then special efforts have devoted to this task. In 1952 ten of the thirty kolkhoz in the lower Amur area already had their own power stations, while power stations were under construction in the remaining twenty. Similar success stories come also from the rest of the Amur region. The strength of these agricultural power stations is mostly very slight and, as a general average for the Soviet Union, lies between 26.0 kilowatts and 55.6 kilowatts. The fishing kolkhoz also have their own small power stations. Thus six additional power stations were built on the coast of the Sea of Okhotsk in 1949, three were built in 1950, and four in 1951.

Petropavlovsk, the capital of Kamchatka, has a power station (12,000 kilowatts), which uses coal and oil. As in the other areas, electrification of agriculture here too is done by small power station. In 1952 the supply of current to ten kolkhoz was assured by newly constructed installations.

A large heat power station is available on the spot to supply the harbor and the industry of Magadan, and an additional power station in Seymchan supplies the gold mining district on the upper Kolyma.

The southern part of the Maritime Krai around Vladivostok is the furthest advanced in its electrification by reason of the coal districts lying close to one another. Accordingly even the railroad lines are electrified. The most important power station (50,000 kilowatts) lies in the brown coal region of Artem in the vicinity of the Ugol'naya station and, in addition to supplying the railroad, it also supplies additional power to Vladivostok. Vladivostok itself has two power stations (12,000 and 13,000 kilowatts). In addition the dockyard has its own installation (around 6,000 kilowatts). The coal district of Suchan is equipped with a power station of its own (6,000 kilowatts), which also supplies current to the surrounding industries. While all the above-mentioned plants rest on coal firing, the claim that the power stations in Voroshilov (two with 6,000 and 5,000 kilowatts) and in Spassk (9,000 kilowatts) employ oil firing appears somewhat unexpected. All the larger localities along the Ussuri Railroad, which contain wood industries predominantly, have their own power installations with mixed firing; for this, next to coal, wood scraps are used primarily. Agricultural power stations are also numerous in the Maritime Krai. By 1950 there were already more than 100, although the supply of current for the countryside was designated as insufficient.

The following have power stations on the coast of the Sea of Japan: the harbor of Tetyukhe (around 3,000 kilowatts) and Ol'ga Bay (6,000 kilowatts). /176/ Sovyetskaya Gavan' has received a new important installation (25,000 kilowatts) to supply the wood and shipbuilding industries there.

On Sakhalin Island there is a power station in the oil region of Okha (24,000 kilowatts) and a coal power station in Aleksandrovsk (approximately 10,000 kilowatts). In the part of the island which formerly was Japanese almost all the coal mining districts have their own central power stations, which, however, have only a small capacity which is used for local needs.

If one surveys the state of development in the supplying of energy in the whole Far Eastern region, one is struck generally by the spotty distribution of power plants of all sizes. They were erected everywhere where energy was needed, with the question of transporting the energy material mostly playing only a subordinate role. As a result of this selection of locations there is a heavy burden on the means of transportation, which have to provide for bringing in the materials. The great step to converting energy minerals, especially coal, into electrical energy at the spot where the mineral is deposited and then transporting the electricity itself has still not been made. To be sure, a restraining factor toward taking this step is the great distances, but these distances in individual cases are not so significant that they could not be overcome by a power network. Also striking is the slight use that has been made of water power in large installations, although the

Soviet Union can rely on rich experience in the execution of projects 377 of this type. Sufficient preparations in this direction have been made, as is summarized in the Atlas of Sources of Energy in the USSR, and from these preparations it can be seen what significant sources of energy, precisely in water power, still lie unused. The potential energy of water power in the Buryat-Mongol ASSR is estimated to be 7 million kilowatts. Chita Oblast is considered to be less favorable. The other Far Eastern regions are all the more richly equipped: their energy is reckoned to be 31 million kilowatts.

The Processing Industry

Some of the various branches of the processing industry have 438 already been mentioned in the discussion of the raw material concerned. This applies especially to the wood and fish industries, which far exceed all other industrial branches, both in the number of plants and in the number of employees in these plants. From the extraordinary wealth of fish and wood it follows that the Far Eastern regions can not only supply themselves with these products but also that with their surplus they can contribute significantly in increasing measure to the supplying of the other parts of the Soviet Union. Wood, wood products, fish, and fish goods, therefore, form also the principal freighted goods which are sent out of the Far Eastern regions. World War II has had an extraordinary influence /177/ on the development of the other branches of industry. Various plants which had been moved to the Far East remained there after the end of the war; other plants were newly created or switched to another type of production in order to replace the loss in production in the areas affected by the war or also to ensure their own needs. Thus the supply situation today is generally more favorable than before World War II, and after this war it has been further improved by the erection of new installations.

In the selection of the location of the industrial plants the same 433 principle apparently appears again and again. This principle is to [185] so distribute these plants regionally in the vast area of the Far Eastern regions so that long transportation hauls are avoided as much as possible. The goal of this planning is to so equip the various areas with industrial plants so that each region can supply its own principal needs. The best example of this is the city of Magadan, from which the mining districts on the upper Kolyma are supplied and whose harbor is free of ice for scarcely six months. Besides repair installations for ocean-going ships

433 and repair shops for motor vehicles, factories have arisen here in which dredges, drilling machines, and other mining needs are produced. There are even factories for the production of glass, crockery, and electric lamps (Pravda November 12, 1947); these factories, according to various announcements, even exceed their annual quota. For these reasons the growth of the city to more than 50,000 inhabitants (1950) is understandable. But, on the other hand, large plants also appear here; mostly they are oriented toward raw materials, and their founding for the most part goes back to the second Five Year Plan. These plants are responsible for supplying extraordinarily large areas, indeed in part for the entire Far Eastern region. This results naturally not only in a burdening of the transportation system but also to inconveniences in regular supplies.

396 Shipbuilding has been fostered with the greatest of energy in the last few years. If Vladivostok with its dockyards for military and commercial ships was the leader in the past, it is at present surpassed by Komsomol'sk in this connection. Nothing has been announced about the capacity of the dockyard installations, but the estimate of the costs for building dockyard installations under the second Five Year Plan give a certain idea of the size of these installations. These costs were six times as large as the sums that were laid out for building the Marty ship dockyard in Nikolayev on the coast of the Black Sea in the Ukraine. This yard was built at approximately the same time and has six docks. The first sea-going ship left Komsomol'sk in 1939. Since then the dockyard installations here have been further expanded. According to their supplying plant, "Amur Steel," whose costs were somewhat higher, the Komsomol'sk dockyards are absolutely the largest plant which has been built in the Far East. The known shipyards in Vladivostok, in Nakhodka in the same area, and also in Nikolayevsk at the mouth of the Amur and in Khabarovsk /178/ have been further expanded. New shipyards have come into being in Sovyetskaya Gavan', in Petropavlovsk on the Kamchakta Peninsula, in Aleskandrovsk on Sakhalin, and in Magadan, which has already been mentioned. In the last two places named, however, there were not new constructions; only repairs were made. Warships were built in Vladivostok, Komsomol'sk, Khabarovsk, and Nikolayevsk. Sovyetskaya Gavan' is supposed to have been expanded recently as a base for smaller man-of-wars. Dockyards in the various river areas are available for building river vessels. Ulan-Ude takes care of the Selenga shipping. In the Amur area there are three dockyards: Kokuy near Sretensk on the Shilka, the left source

river of the Amur; Blagoveshchensk with the important Lenin Dockyard 396
at the mouth of the Zeya; and Khabarovsk at the beginning of the
lower course of the Amur.

In the machine industry the construction of transportation 397
machinery in especially large plant installations is in the foreground.
The railroad workshops of Ulan-Ude, Chita, Khabarovsk, and Ruzhina
near Vladivostok serve to supply and maintain the railroads; all of
these workshops are large installations. The most important of these
is the plant for the construction of locomotives and railroad cars in
Ulan-Ude. It constitutes an entire section of the city, which, according
to a Soviet report, has three times as many inhabitants as all of Ulan-
Ude (Verkhne Udinsk) before World War I. Since at that time the city
had approximately 15,000 inhabitants, approximately 45,000 persons
must be connected with this plant in some fashion. This also corresponds
to the importance of the plant which is competent to supply the rail-
roads not only of the Far East but also of all east Siberia. According
to the plant's projected capacity, it is supposed to be in a position to
deliver 2,000 passenger cars and up to 12,000 freight cars a year in
addition to an undetermined number of locomotives. The other large
railroad workshops mentioned above are in a position to repair loco-
motives and to overhaul them completely and also to a limited extent
to build railroad cars. The base for motor vehicle production lies in 398
Khabarovsk, which in the "Kaganovich Plant" has the largest installa- 399
tion of this type in the Far East. Airplane factories exist in Khabarovsk 407
and Vladivostok. In contrast to the industry for transport machinery,
the construction of agricultural machinery is distributed among a large
number of places. Only Khabarovsk has a large plant.

In the building materials industry, with progressive industriali- 339
zation, the need for modern building materials grew so much that a
bottleneck has arisen here. Numerous small brick works and lime kilns
must first be created, which are scattered over the vast areas and which
in each case satisfy the local needs. A mechanized large brick-works
was brought to life in the city itself for the building up of Komsomol'sk.
The need for cement which is especially great had to be covered for
the most part by other regions in the Soviet Union /179/ up to the be-
ginning of World War II.

Up to 1937 there were in the Far East only two cement factories, which were in Spassk north of Vladivostok. Production here in the same year was 164,000 tons. By 1942 this production had already reached 525,000 tons. In this output the production of the cement

339 factories newly created in Komsomolsk, Khabarovsk, and Londoko
in Birobidzhan shows. The last-named cement plant has very recently
been expanded into the largest such plant in the Far Eastern region
next to the plant at Spassk. For the supplying of Transbaykal a
cement plant has been newly erected in Temlyuy, 98 kilometers west
of Ulan-Ude.

288 In light industry, a new cloth factory in Ulan-Ude is worth
mentioning. It was moved here in 1941 and since then it has been
so greatly expanded that it delivers several million meters of cloth
a year. It is the first cloth factory in the Far Eastern regions. In
Birobidzhan there is an important plant in the clothing and knitting
goods industry; Khabarovsk and Vladivostok have additional large
undertakings in the manufacture of ready-made clothing. In the fu
295 goods and leather industry there are two outstanding central points t
be mentioned, both of which are in Transbaykal: Chita with the
largest fur and leather works in the Far Eastern regions; and Chikoyskiy
Zavod, which lies east of Kyakhta on the river of the same name,
which draws its raw materials from the Mongolian People's Republic.
The production of Chita alone is sufficient to supply all of east Siberia
with furs and leather. Shoe and other leather goods factories exist in
various places. The shoe factories produce approximately 3 million
323 pairs a year. Only one plant--although, to be sure, one of large
dimensions--is available to supply a large part of the Far Eastern regions with glass, glass goods, crockery, and porcelain. This plant
lies in Ulan-Ude and represents the largest glass and glass goods factory
in Siberia. In addition to window and mirror glass, it also supplies
special glass for special purposes. According to the projected capacity
it is supposed to be in a position to deliver 14,000 tons of plate glass
and 6,000 tons of mirror glass. Ulan-Ude is responsible for supplying
all of east Siberia with glass. Mention has already been made of the
glass factory in Magadan. A smaller factory is supposed to still exist
in the Vladivostok area.

The food and luxuries industry is represented by numerous
256 small plants in the agricultural regions. Khabarovsk, Svobodnyy, and
Blagoveshchensk have large mills. The first two have a processing
capacity of 200 tons of grain per day; the Blagoveshchensk mill is supposed to be even bigger. The large bread and other baked goods plants,
which are typical of Soviet cities, are also to be encountered here.
255 Khabarovsk has the most important installations of this type. The surplus of meat produced in Transbaykal are processed into preserved
products and canned goods in the two meat plants in Ulan-Ude and in
Chita.

Chita. Until a few years ago there were only two sugar factories in Voroshilov (Ussuri-Khanka Area) to supply the sugar needs. The largest of the two could process up to 1,400 tons of sugar /180/ beets a day. In order to supply Chita Oblast and the Buryat-Mongol ASSR, the cultivation of sugar beets has been begun there since 1943, and a sugar factory has been built in Bichura in the Buryat-Mongol ASSR. Another such factory is supposed to be built in Chita. The extraction of plant oils is done primarily by two large oil mills in addition to numerous small installations which are part of agricultural establishments. One of these large oil mills is in Blagoveshchensk, where primarily sunflower seeds are processed; the second of these large oil mills is in Voroshilov. It specializes in the processing of soy beans and perilla seeds. 257 258

/181/ TRANSPORTATION

General Significance of the Transportation Situation

The pressure (to have access) to the sea was the real reason for the unrelenting march of the Russians to the Pacific. The unfavorable situation of the Sea of Okhotsk caused them to turn to the south, where the mouth of the Amur awakened hopes in them. With obstinate patience they endured one and a half centuries until this goal, too, was attained. Their hopes, however, were disappointed. Nikolayevsk at the mouth of the Amur did not prove itself to be a suitable harbor and open door to the Pacific. In Vladivostok a more favorable place and an excellent harbor was found, but it developed slowly because the immediate hinterland was still not developed and the route from Siberia through Russia's own territory via Khabarovsk was too far. Thus, by virtue of a treaty with China, the "Chinese East Railroad," as the Russians call the north Manchurian railroad, was laid as a straight line crossing through Manchuria, even before the Amur railroad was built. With this the way to Vladivostok was shortened by about 1,000 kilometers. The north Manchurian railroad was completed in 1904; the Amur railroad, on the other hand, was completed only in 1916. The harbor in Vladivostok, however, is closed by ice for an average of 110 days, and during this period must be kept open by ice-breakers. So the glance of the Russians shifted to the south and rested in the harbor of Dal'nyy, "the far away," which was later renamed Dairen by the Japanese. From Harbin the Russians laid a railroad to Dal'nyy and laid out Port Arthur to protect the naval port. The route from Harbin 489 648

489 648 to Dal'nyy was, to be sure, 325 kilometers longer than the route to Vladivostok, but the ice barrier in Dal'nyy was scarcely noticeable, and a second access to the Pacific was attained. In the Russo-Japanese War, to be sure, this southern position was lost, and in 1935 the north Manchurian railroad, too, was lost through forced sale. However, the outcome of World War II brought all these positions again into the hands of the Soviet Union, who restored the earlier situation by new treaties, and who thereby shows that she will pursue again the old path of the Czars. And the day is no longer far off when a railroad will lead from Ulan-Ude in Transbaykal via Ulan Bator (Urga) to Peking and Tientsin. As she did in the case of the Manchurian route, the Soviet Union can, on the basis of treaties, create another way out, which, going from Ulan-Ude directly to the sea, is more than 500 kilometers shorter than the route to Vladivostok. Only the middle piece is still missing.

648 /182/ As a result of this transportation situation, the Soviet Union exercises extensive influence on the neighboring regions. When the north Manchurian railroad was built from 1897 to 1904, northern Manchuria was extremely lightly populated. Harbin, at that time a small fishing village, already had a population of 470,000 by 1938. With the growing settlement of the land the influence of the Russians also grew, working through the railroad lines which were the nerve centers of life and of the economy. The influence of the Russians was especially great in northern Manchuria which was principally settled after the construction of the railroad; and even the Japanese were not able to eliminate this influence in the period from 1931 to 1945. It can be assumed to be obvious that this influence will begin to grow anew since the main economic channels again have received Russian blood. In this growth of influence, the limits are not in sight. In this the fact that Manchuria is surrounded geographically in the east by the Ussuri county, which in Vladivostok has the closest world harbor for northern Manchuria, is of just as great significance as the fact that northern Manchuria is surrounded on the west by the Mongolian People's Republic. And here Transbaykal plays a particular role. It represents not only a natural continuation of the Mongolian landscape; but also the Buryat Mongols are the closest relatives of the Khalkha Mongols, and, under Russian and Soviet Russian rule, the Buryat Mongols culturally and economically have attained a great jump ahead of their brothers on the other side of the border. From this an influence which will have an effect over the border can be explained as perfectly natural,

without any additional reasons. It must also be assumed as obvious 648
that Buryat-Mongol relationships in the Soviet Union served as a model in the formation of the Mongolian People's Republic and its organization into a state, and also that thereby the influence of the Soviet Union has grown far beyond its political borders.

Land Transportation

Transportation acquires a striking importance with the size of 489
the area. The development has shown that the transportation installations were not created because there was a necessity based on the economy of the region itself, but rather that the transportation-political standpoint of the entire state was decisive for the various transportation installations. The Amur railroad and also the Ussuri railroad were for their part built through regions which were often completely uninhabited or settled only extremely slightly. Only with the construction and [167]
after the completion of these railroad lines did people stream in in larger numbers, and accordingly the railroads became pacemakers for the colonization and development of the economy. Even today it is still so. Connection with the transportation system is the necessary condition for winning new settlement areas and for exploiting the rich natural resources of this vast land.

With the slight density of population, transportation installations, such as for example the railroads, which required a great expenditure of capital and labor, often /183/ prove themselves to be unsupportable economically, unless these installations correspond to another, higher point of view, or are built for the future in a far-sighted fashion. In both cases it is up to the power and the enterprising spirit of a great state organism to carry out mighty tasks of this type. That was the case with the old Russia and it is also the case with the Soviet Union. At any rate the slightness of the railroad network goes back to these reasons. In contrast to these, however, the transportation installations, whose introduction required only slight outlays of money, are much better developed. To this category belongs water transportation, whose present state, according to the judgment of Soviet specialists, exceeds even that of the European part of the USSR. Also in this category is air transportation.

The railroads are the main bearers of the traffic. The eastern 496
part of the Trans-Siberian Railroad constitutes the main vein. It runs from Lake Baykal via Ulan-Ude and Chita across Transbaykal, and then,

always at some distance from the Amur and the Ussuri, it runs to Vladivostok. In Karymskoye, east of Chita, the Manchurian line branches off from the Trans-Siberian Railroad. The Manchurian line leaves Soviet Russian territory after the border station of Otpor and runs via Harbin to the southeastern part of Manchuria. At Grodyekovo it again enters Soviet Russian territory and in Voroshilov (Nikol'sk-Ussuriski) it meets the Ussuri Railroad.

In terms of administration the railroad lines are under four directive bodies and bear different official names:

1. The East Siberian Railroad. The central administrative office is in Irkutsk. Its sphere stretches from Tayshet to Kizhi, and lies on the administrative border between the Buryat-Mongol ASSR and Chita Oblast. Under this directorate the total length of railroad lines, including side railroads, is 1, 304 kilometers.

2. The Molotov Railroad. Its administrative seat is in Chita. Its administrative sphere extends from Petrovsk (the first station east of Kizhi) to the Ksen'yevka station on the upper course of the Black Uryun. The total length of the railroad line is 1, 330 kilometers.

3. The Amur Railorad. Its administrative seat is in Svobodnyy. Its administrative sphere extends from Ksen'yevska up to but not including Arkhara station, which is east of Bureya. The total length of its railroad line is 1, 498 kilometers.

4. The Far Eastern Railroad. Its administrative seat is in Khabarovsk. Its administrative sphere extends from Arkhara to Vladivostok. The total length of its railroad lines is 1, 989 kilometers.

This purely administrative division is very impractical from a geographical point of view. Therefore from way back a division into three has seeped in, namely: 1. The Transbaykal Railroad from Mysovaya, where it leaves Lake Baykal, to Kuenga, where the railroad turns to the north from the valley of the Shilka and from here begins to follow the course of the Amur; 2. the Amur Railroad from Kuenga to /184/ Khabarovsk; and 3. the Ussuri Railroad from Khabarovsk to Vladivostok. The above classification of the individual railroads is used in this work.

Since the route via Manchuria (Harbin) to Vladivostok is about 1, 000 kilometers shorter than the indirect route via Khabarovsk, the main traffic from the Soviet Union to the east takes the Manchurian route; and to the Amur and Ussuri railroads there remains only a secondary, more local rank. Since they, however, run through Russia's own territory, they receive the task of maintaining a second position, a substitute line, which is put into action immediately if the first railroad line is disturbed for any reason. 496 This was the case during the period of Japanese rule in Manchuria from 1931 to 1945. It was during this period that the pressing necessity of a second track for the eastern part of the Trans-Siberian Railroad first arose. The second track for the stretch from Ulan-Ude to Urusha (1, 570 kilometers) was laid from 1933 to 1935; the stretch from Urusha to Khabarovsk (1, 314 kilometers) was laid from 1934 to 1936; and the stretch between Khabarovsk and Vladivostok (768 kilometers) was not laid until 1936 to 1939. The North Manchurian Railorad, on the other hand, was built with two tracks from the beginning. Of greatest importance is the fact that the Russian track width was not changed in Manchurian territory from 1931 to 1945, and, accordingly, the railroad line was available for the use of the Soviet Union immediately after the end of World War II. In the period from 1905 to 1945 the Japanese changed only the South Manchurian Railroad (Harbin to Dairen) to the Japanese track width (normal tracks), while the North Manchurian Railroad was always traveled by Russian locomotives and Russian railroad cars.

The construction of the Transbaykal Railroad began in 1895 499
and was supposed to be completed in 1898. However, a flood, such as Transbaykal had never experienced, caused such extensive damage that it was only in 1900 that traffic could cover the entire stretch. Construction of the line was very difficult. The ground in Transbaykal is permanently frozen and thaws in the summer only to a depth of one to two meters. As a consequence of this, the work had to be done during the warm part of the year with dynamite under the thawed out layer of earth; this turns the thawing masses of frozen earth into a thick porridge /Brei/. The installation of water conduits was especially difficult. In order to prevent freezing, the water pipes had to be laid in wooden galleries which could be heated. Since according to the construction specifications only Russian materials could be used, these materials had to be procured in part via Vladivostok and Khabarovsk. For this purpose state shipping was established on the Ussuri, Amur, and on the Shilka as far as Sretensk. This resulted at the same time in a permanent opening-up of this waterway.

The section from Sretensk to Khabarovsk was originally envisaged as a continuation of the Transbaykal Railroad to the east. The marking /185/ out of this line, however, pointed up such great difficulties and such unfavorable economic conditions that this plan was

499 abandoned and it was decided to build the railroad from Transbaykal to Vladivostok across Manchuria. Negotiations with China led in 1896 to a concession to the Russo-Chinese Bank for the construction and management of a railroad through Manchuria; this railroad received the name of East Chinese Railroad. The East Chinese Railroad Society, founded on the basis of this concession, received the right to manage the railroad for eighty years after the opening of the line. After this period the railroad was to fall to China without compensation. The society was further required to construct a connecting railroad from the eastern border of Manchuria to Nikol'sk-Ussuriski, the present day Voroshilov, and also to erect a railroad line from Harbin to the ice-free south Manchurian harbors of Dal'nyy and Port Arthur. The main line from Manchuria to Grodekovo was begun under Russian direction in 1897 and was completed in 1904. The completion was delayed so long because the rebelling Chinese in the Boxer Rebellion of 1900 completely destroyed approximately 950 kilometers of the 1,350 kilometers completed. The result of this was the occupation of Manchuria along the main lines by Russian troops, which remained until 1904-1905, and, consequently, the Russo-Japanese War could be fought out on Manchurian territory.

The construction of the last part of the Trans-Siberian Railroad between Vladivostok and Khabarovsk occurred before the completion of the Amur Railroad. The consturction of the southern half began in 1891 and was completed in 1894: the northern half was completed from 1894 to 1899. The resolution of the labor question was especially difficult here in the regions still little populated. As with the Transbaykal Railroad, this problem was alleviated by the use of military detachments, prisoners, and forced settlers.

There was the longest hesitation on the construction of the Amur Railroad. The inexact knowledge of the land, the vast uninhabited areas, the unfavorability of the climatic and soil conditions, and the great length of approximately 1,500 kilometers were discouraging. Decisive for the decision was the outcome of the Russo-Japanese War. In 1908 construction was begun on partial stretches, and only in 1916 was the entire stretch open to traffic. Here, too, permafrost was one of the greatest difficulties. Heaped up railroad embankments melted away often and breaks in the ground were filled up again and again by solifuction. Water had to be drilled from layers which lay under the frozen earth. The strict specification, which applied here, too, that only Russian workers and no yellow-skinned assistants were to be used in the construction, attained brilliant results not only because many 499 millions of rubles remained in the country but also primarily because it fostered colonization. Many thousands of workers, who were [167] recruited from Russia, learned to know the Amur country and settled in the land after the completion of the construction.

/186/ The Trans-Siberian Railroad leads through the most important localities in the Far Eastern region. 496 The distances between the most important localities are as follows in railroad kilometers: Irkutsk--Ulan-Ude, 490 kilometers; Ulan-Ude--Chita, 554 kilometers; Chita--Khabarovsk, 1,428 kilometers; Khabarovsk--Vladivostok, 768 kilometers; Karymskoye--Otpor (border station), 366 kilometers; Karymskoye--Harbin--Vladivostok, 1,981 kilometers.

A number of branch railways lead from the main line to localities which are important economically or in terms of transportation. On the Transbaykal Railroad and the Amur Railroad the following, from west to east, are to be cited.

Ulan-Ude	--Naushki (Mongolian border)	225 kilometers
Petrovsk	--Balyaginsk (iron ore)	19 kilometers
Tolbaga	--Khalyarta (coal)	8 kilometers
Ingoda	--Ildigun (wood, agriculture)	52 kilometers
Priiskovyy	--Nerchinsk (city connection)	10 kilometers
Kuenga	--Sretensk (Shilka harbor)	55 kilometers
Pashennaya	--Bukachacha (coal)	73 kilometers
Skovorodino	--Dzhalinda (Amur harbor)	60 kilometers
Ushumun	--Chernyaye (Amur harbor)	38 kilometers
Kuybyshevka	--Blagoveshchensk (Amur harbor)	109 kilometers
Bureya	--Raychikhinsk (coal)	43 kilometers
Arkhara	--Innokent'yeva (Amur harbor)	35 kilometers
Izvestkovyy	--Ust'-Tyrma (coal)	190 kilometers

Of these lines the railroad from Ulan-Ude to Naushki is of the greatest significance. It was completed in 1939 and leads to the Mongolian border. Since then it has been lengthened to reach Ulan Bator (Urga), the capital of the Mongolian People's Republic. Then, in addition, various side lines have been created in the last few years. Thus a railroad line leads from Skovorodino over 150 kilometers to Tyndynskiy in the area around the upper course of the Gilyuy, and there is supposed to be a connection to the new Baykal-Amur Railroad (BAM). Also the Izvestkovyy--Ust'-Tyrma line named last in the above list has since been extended via Chekunda to Ust'-Niman in the upper area of the course of the Bureya, and today this line has probably already reached the wolfram-molybdenum plant at the mouth of the Umalta. In addition to its local task of opening up the Bureya coal fields, this railroad line is also regarded as a cross connection from the Amur Railroad to the BAM, which, according to the original plan, was to cross the Bureya at Chekunda. Furthermore, two new railroad lines from the Amur Railroad to the Amur River have been built, one from Zavitaya to Poyarkovo, which at the same time offers a new opportunity for transporting things from the brown coal district of Raychinkhinsk; and one from Birobidzhan to Leninskoye.

The opening up of the lower Amur country was also served by a railroad only completed in the last few years; this line leads from Volochayevka, always at some /187/ distance from the Amur and on the left side of the Amur, to Komsomol'sk, the new industrial city with much promise. On the right bank of the Amur, approximately opposite Komsomol'sk, there begins then at Pivan the great wooden railroad line which crosses the Sikhote-Alin' and then leads in a southeasterly direction to Sovyetskaya Gavan' (Soviet Harbor) to the coast of the Sea of Japan. In Komsomol'sk a railroad ferry joins the two lines.

From the Ussuri Railroad several wooden railroad lines penetrate into the Sikhote-Alin'. The branch from Manzovka to Turiy Rog should be named as the most important side line; for this line opens up the rich agrarian territory on the western side of the Khanka Lake. The environs of Vladivostok, which are rich in coal, are crossed by several lines. The most important branches off in Ugol'naya north of Vladivostok toward Suchan in the east, and with two sourthern branches in Dunay and Nakhodka it reaches the sea coast. In the last few years still another railroad line has been built which branches off in the north from Vladivostok, extends approximately along the west coast of the Bay of Peter the Great and ends in Kraskino at the Pos'yet Bay.

The greatest railroad undertaking of the present is the Baykal-Amur Railroad, which has already been mentioned. It is abbreviated as BAM (Baykal-Amur-Magistrale). A veil of secrets surrounds this railroad, which has been under construction since 1938 with its length of around 3,500 kilometers and which, according to various reports, which, however, are not reliable, is supposed to have been completed. It begins at Tayshet station which lies on the Siberian Railroad between

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Kansk and Nizhneudinsk, and leads via the Angara to the upper Lena, which it leaves before the mouth of the Vitim in order then to follow the Vitim to the mouth of the Kalar. The line then crosses the Kalar Massif toward the east, crosses the Olekma at the mouth of the Nyuksha, and extends to the valley of the Gilyuy, along which it runs as far as the mouth of the Gilyuy at the Zeya. Then the railroad line follows the breach valley of the Zeya through the Tukuringra Mountain Range toward the south and finally turns again toward the east. The Selemdzha is crossed at Norsk, the point at which its navigability begins, and the Bureya is crossed at Chekunda, the center of the greatest hard coal deposit in the Far Eastern region, a deposit which is just beginning to be opened up. The BAM ends in Komsomol'sk on the Amur. Various cross lines are supposed to provide a connection with the Amur Railroad, and of these two have already been completed. In its course, the BAM cuts through forested areas which are rich in wood but are still completely untouched; in the northern part of the Amur country the BAM crosses through the most important gold fields; and it opens up important deposits of natural resources. The construction difficulties are supposed to be extraordinarily great. It is a railroad of the future, and it is to be expected that gradually a belt of settlements will come into being following the railroad line; the railroad workers set up in permanent dwelling places, even now constitute the basis for such a belt of settlements.

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Since the main railroad lines and also the main water veins /188/ cross through the zone of settlements in the longitudinal direction from west to east, built up land routes in this direction are rare. The old Siberian tract, which before the construction of the Trans-Siberian Railroad crossed through the entire region in the longitudinal direction, has long since lost its significance as an overland route and today serves as a local connection. The Ussuri section is an exception. In the last few years this has been rebuilt from Vladivostok to Khabarovsk as an automobile highway with a firm understructure to supplement the railroad line. On the quality of this route a report says that approximately 18 hours are required to travel the approximately 770 kilometer long stretch in a passenger motor vehicle. Furthermore the greatest attention in the last few years has been devoted to extending this highway: above all it has been extended from Khabarovsk to Komsomol'sk and undoubtedly represents the most important highway in the Far East. Most of the remaining land routes have more the character of feeder routes; but regardless of this these routes are of great economic importance and as a rule can be traveled by trucks.

Apart from the steppes of Transbaykal, where unhampered land traffic without building roads is possible throughout the year, land transportation in the Amur and Ussuri regions suffers from the great dampness of the ground and from the monsoon rains. The heavy rainfall which descends suddenly often destroys the roads and carries away the thin layers of the road bed. Where an understructure does not exist--and this is the case with most of the land routes--the routes become foundationless and become so quickly spoiled by heavy carting that using them is possible only with great difficulty. Also the high water of the rivers often tears away light bridges and by flooding breaks off the connections between the individual localities often for weeks.

Some land routes, however, have more than a local character and have the importance of overland routes. More care is also devoted to them. They are provided with a solid superstructure and good bridge installations, and, therefore, they are usable throughout the year by trucks, which are the principal means of transportation on these roads. In this connection the Kyakhta Tract should be mentioned first; formerly it had to overcome the exchange of goods with Mongolia. A western branch leads through the valley of the Dshida as far as Gorodok, the center of molybdenum extraction in western Transbaykal. From Chita a good route leads toward the north to Romanovskoye on the upper Vitim, and a second route leads directly toward the south to the upper course of the Onon to the tin mines of Khapcheranga and on the Sokhondo. An overland route of grand style takes its beginning at the Never station, which lies east of Skovorodino, and leads via the gold regions on the upper Gilyuy and Aldan to Yakutsk, the capital of the Yakut Republic.

In winter the rivers appear as valuable natural traffic routes. Their ice covering is so strong that they can carry the heaviest vehicles. /189/ The goods piled up during the summer not in the reach of the main traffic lines are then brought into the centers of the land with caravans of sleds or trucks. Even on the Amur and the Shilka long columns of motor vehicles are to be encountered during the winter.

However, already in the northern part of the Amur country all improved roads end. There begins the great wide north of the Far Eastern region, whose peculiar transportation conditions are to be treated in a special section.

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Water Transportation and the Hydrographic Conditions

The development of water transportation has been favored by the fact that the most important regions economically belong to a single river area, that of the mighty Amur. Only the western part of Transbaykal has a water network of its own, but in its most important sections economically, western Transbaykal, too, is encompassed in a single river system, that of the Selenga.

The Amur is the largest river in the Far Eastern regions. It arises from two source rivers, the Shilka and the Argun, and the Shilka in turn is also formed by two source rivers, the Onon and the Ingoda. The longer of these is the Onon. If the Onon is taken as the real source river of the Amur, then the Amur has the great length of around 4,330 kilometers. However, even the real Amur from Pokrovka, where the Shilka and Argun converge, to the mouth has the considerable length of 2,846 kilometers. The entire river /drainage/ area of the Amur attains the immense size of 2,054,510 square kilometers. Of the rivers in the entire system which are at the disposal of the Soviet Union, 7,079 kilometers are designated as navigable for steamers, and anothers are designated as navigable for rafts.

The upper course of the Amur is 901 kilometers long and extends from Pokrovka to Blagoveshchensk, i.e., to the mouth of the Zeya. On its left side the Amur receives here the Amazar, Oldoy, and the Zeya. Great heights, which are covered with coniferous forests and which are in part rocky, follow the course of the Amur along the upper part. Below Dzhalinda the heights retreat. On broad terraces cultivated stretches of land appear with numerous settlments. The river bed becomes wider. Flat sand islands emerge here and there. Tortuously and slowly the river winds along. The middle course of the Amur stretches from Blagoveshchensk to Khabarovsk, i.e., from the mouth of the Zeya to the mouth of the Ussuri; it is 992 kilometers long. Great and important tributaries flow into this section of the Amur: the Bureya comes in from the left and the Sundari and Ussuri from the right. The left bank here is for the most part formed from the flat Zeya-Bureya plain, while the right bank, which is Manchurian, appears hilly. The width of the river reaches 1 to 3 kilometers and more, but is pressed together to approximately 500 meters as it breaks through the Bureya Mountain Range. However, below Khabarovsk the 953 kilometer long lower course of the Amur stretches out into an extraordinarily wide lowland river with numerous arms and islands.

133 Here, too, the left shore is mostly flat and swampy; the right, on the other hand, is hilly and drier. Now and again mountain chains also appear /190/ on both sides of the river and force its masses of water into a closed bed. The last part of the river is closed in on both sides by mountains, although the river still reaches a width of 5 to 10 kilometers in places.

[505] The Amur is navigable for its entire length, and its source rivers, too, are still regularly traveled by steamers, the Shilka being traveled as far as Sretensk and the Argun as far as Olochi. The speed at which the Amur flows is varying and depends on the drop at any one spot. In this the river has to overcome three steps: the Great Khingan, the Bureya Mountain Range, and at the end the Sikhote-Alin'. The mean velocity of the Shilka and of the upper Amur is 5.5 to 6 kilometers per hour, that of the middle Amur is 4.2 kilometers, and in the lower course of the Amur the mean velocity is 3 kilometers and less. The conduction of water varies greatly, especially in the upper course, since here the source rivers, especially the Shilka, dry up almost entirely in the period of less water--and here this period is the winter. At this time the Shilka conducts only approximately 8 cubic meters per second at Sretensk, while at the same place it conducts 142 cubic meters when the water level is normal, and 420 cubic meters when the water is high.

The following table shows what quantities of water the Amur carries along in its various parts and the differences in the water fluctuations at the various localities:

Localities	Length of this section of the river in kilometers	Drop of this section of the river in meters	Water conduction, Annual mean in cubic meters per second	Minimum in cubic meters per second
From Pokrovk--				
Albasin	238	55	1,200	125
Chernyayevo	190	49	1,500	165
Kumara	213	39	1,700	200
Blagoveshchensk	226	33	1,800	220
Poyarkovo	164	17	4,000	550
Innoken'yevska	130	17	5,000	700
Yek. Nikol'skaya	252	36	5,500	850
Mikh. Semenovskaya	190	14	8,500	1,500

(Table continued on following page)

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Localities	Length of this section of the river in kilometers	Drop of this section of the river in meters	Water conduction. Annual mean in cubic meters per second	Minimum in cubic meters per second
Khabarovsk	258	15	10,000	1,800
Komsomol'sk	360	16.5	11,100	2,000
Bogorodskoye	410	12	11,700	2,100
Mouth	170	4.5	12,200	2,200

Corresponding with the water conduction, the water horizon fluctuates more in the upper parts of the river than in the lower parts. The range of the annual water fluctuation is 9.7 meters at Sretensk, a mean of 6 meters at Khabarovsk, and only a little more than 2.40 meters at Nikolayevsk. However, the high water which appears very suddenly as a result of downpours of rain in the summer, varies greatly from year to year. The floods from the mighty /131/ river area often break so quickly that they cause great destruction. The largest known flood was in 1872. At Blagoveshchensk the water rose 10 meters in a short time, and in the narrow break-through valley of the Bureya Mountain Range the water even rose 15 meters. The water masses pouring out wildly and in an unruly fashion tore along with them numerous settlements near the river and their people, animals, and property. The year 1928, too, was distinguished by an extraordinarily heavy high water, which brought the city of Blagoveshchensk into a state of great distress.

Because of the ice covering the navigable period of the Amur is limited to the summer months. The mean duration of the ice-free period is 155 days at Sretensk, 170 days at Blagoveshchensk, 185 days at Khabarovsk, and again only 160 days at the mouth of the Amur. On the middle Amur the southern location makes itself felt, and at Khabarovsk the effects are felt of the emptying in of the great rivers coming from the south, the Sungari and the Ussuri. These two rivers become free of ice earlier than the Amur and bring warm water into the Amur. In the periods of navigability the view is hindered in the mountain regions by thick morning fogs which force the ships to travel more slowly or even to stand still. Then rapids and stony areas constitute a hindrance in the upper part, and sand banks in particular constitute a danger for almost the entire course of the river. The sand banks consist mostly of soft, slimy masses of sand, which form in the river bed as

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133 505 longish heaps which are constantly being added to; and when the water is low, these sand banks also often emerge as islands. The lower Amur has no hindrances and can be used at all times by ships with a depth of up to 3 meters, and on the last 420 kilometers of the river it can even be used by ships with a depth of 6 meters and more. If broad, flat sand bars did not close off the entrance at the mouth of the river, sea-going ships could travel 100 kilometers into the Amur. The annual changes of the water conduction causes the ship traffic on the upper part of the Amur to be such that from May to August ships with a depth of 1.5 meters can go as far as Blagoveshchensk and ships with a depth of somewhat more than 1.0 meters can get as far as Sretensk on the Shilka without hindrance. In September, on the other hand, travel as far as Blagoveshchensk is dangerous for ships with a depth of 1.20 meters and travel as far as Sretensk is dangerous for ships with a depth of 0.90 meters. These limitations apply to through traffic and do not exclude the possibility that in individual parts of the river, where shallow places do not hinder passage, larger ships could also be employed without limitations in local traffic.

The Amur as the main water vein in the entire land receives its great importance for transportation only through its numerous and important tributaries. These are in large measure navigable by ships, and over even larger lengths navigable by rafts, and thus open up wide areas of the entire province.

The Shilka is the main source river of the Amur and drains the water from an area of more than 210,000 square kilometers. Its source river, the Ingoda, is navigable by rafts for 455 kilometers, and, when the water is high, it is hypothetically navigable by ships from approximately Chita on. The Ingoda itself and its right tributaries come from richly forested areas and bring /192/ to the Amur wood above all. The Onon is navigable by rafts for 550 kilometers. In its upper course it is a steppe river, and only in its lower course does it flow through forested region.

The Argun, with a total length of 1,580 kilometers, drains an area of 260,000 square kilometers. It rises in the Great Khingan in Manchuria, where it bears the name of Hailar, and it receives also numerous tributaries from the right. Thus it never suffers from a water shortage. On the other hand mountains appear right on the river at its lower end and produce various strong rapids. The bed is stony and not uncommonly is filled with large blocks of rock, which in many cases lie across the river like chains, making it very difficult for ships to

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get through. Although its middle course along the border is 200 to 300 meters wide and has sufficient depth, which in places it up to 8 meters, the Argun is regularly traveled only on the last 54 kilometers. The floating of wood, on the other hand, is very active on the entire course of the river.

The Zeya with a length of 1,225 kilometers and a width of up to 2 kilometers, is the most important left tributary of the Amur. In its upper course it has a sharp drop, and only below its breach through the Tukuringra Mountain Range does it quiet down. The monsoon air masses, which are forced to rise in the mountains in the area around the upper course of the Zeya, bring especially heavy rainfall here. The water conduction reacts very exactly to this rainfall, and thus, according to the downpours of rain, high waters arise and the river then again and again goes over its normal banks. Thus during almost the entire summer the Zeya conducts a great deal of water and is hypothetically navigable for medium-sized steamers for 950 kilometers and even 1,100 kilometers for smaller steamers. Zeya-Pristan' (harbor) is the end point of the regular steamer traffic. Here the goods are stored up during the summer in large warehouses in order then in the winter to be taken by sled into the gold districts on the upper course of the Zeya and on its tributary, the Gilyuy. The new Baykal-Amur Railroad crosses the river at Zeya-Pristan'. From the left there flows into the Zeya the Selemdzha which is 690 kilometers long and which is navigable by ships as far as Norsk.

Water Conduction of the Zeya

Locality	Annual Mean in cubic meters per second	Minimum in cubic meters per second
Zeya-Pristan'	1,100	22
Tyda Estuary	1,350	45
Selemdzha Estuary	2,100	105
Mouth	2,350	125

The Bureya, the next large left tributary of the Amur, is 740 kilometers long and up to 700 meters wide on its lower course. The upper and middle course of the river flow through mountainous regions and conceal numerous obstacles. Thus the river, which is rich in water, is navigable only on its last bit. When /193/ the water level

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is high, however, steamers get over 345 kilometers along the river as far as Chekunda, indeed on occasion as far as the mouth of the Unalta. The Bureya is important as a supply route for the gold regions on its upper course.

The Zeya and Bureya bring a great deal of wood to the Amur.

Water Flow of the Bureya

Locality	Annual Mean in cubic meters per second	Minimum in cubic meters per second
Niman Estuary	392	8
Ushumun Estuary	579	11.5
Talakan Estuary	980	19
Daldakan Estuary	1,025	19.5
Mouth	1,067	20

The Ussuri River is on the border toward Manchuria. Its length, including that of its source river, the Daubikhe, is more than 900 kilometers, its width fluctuates between 100 and 1,000 meters. It is navigable by ship for its entire course, and it is regularly traveled even though sand banks and other shallows offer obstacles on the winding course. The Ussuri line is the best opened up in terms of transportation, for the main railroad and a highway also run in the direction of the river.

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Water transportation in the Amur area is mostly served by small steamers with a mean of 500 indicated horse power and with a carrying capacity of their own of 250 tons. However, recently numerous larger vessels have also been employed which have been specially built for service here. As a rule wide, shallow-draft barks are used to transport goods; these barks have a carrying capacity of up to 800 tons and are mostly put together in trains of barges. The number of river steamers and tug boats in the 1930's was more than 200 and has since probably been enlarged. In addition to the transporation fleet, there is also an Amur war fleet, which has its seat in Khabarovsk and which consists of river gun boats with a size of up to 1,000 gross register tons.

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The main part of Transbaykal to the west is drained by the system of the Selenga. The Selenga comes from Mongolia and rises there from the two rivers, the Ider-Gol and the Muren-Gol. The length of the Selenga is 1,272 kilometers, its river area covers 511,464 square kilometers. Not far from Kyakhta it enters the territory of Transbaykal,

where it flows for another 414 kilometers. In this part the Selenga is 133
200 to 450 meters wide and has a mean depth of 1.6 meters. The 505
mean velocity reaches 5.6 to 8.5 kilometers per hour. Apart from a
bar off the mouth, which makes entrance into the river difficult, there
are no large hindrances here, and accordingly the Selenga can be
designated as completely navigable in this part. Occasionally smaller
steamers travel 480 kilometers into Mongolia during the high water
period in the summer. The period when the river is navigable lasts
exactly half a year. The water level during this period fluctuates
approximately 2 meters as a mean. Regular steamer shipping /194/
has developed as far as Ust'-Kyakhta. The tributaries are traveled as
needed. The largest tributaries are the Chikoy, which is more than
740 kilometers long and is navigable by ship for 249 kilometers; the
Khilok, which is 742 kilometers long; and the Uda, which is 403 kilo-
meters long. The center of water transportation is Ulan-Ude, where [504]
there is also a dockyard for steamers and barks. In connection with
the Selenga there is also water transportation on Lake Baykal and on
the Angara as far as Irkutsk. The total number of steamers here in
1930 was 87, and the total number of barks was 185 in contrast to only
13 steamers and 18 barks in 1912.

The importance and the capacity of water transport on the 505
Amur exceeds that of the Selenga by several fold. The following
table gives a comparison:

Water Transport 1939
in 1,000 tons

	Total	Oil	Wood		Grain	Mineral Construction Materials	Salt
			By ship	By raft			
Selenga	200	7	7	91	45	14	1
Amur	1,305	191	11	645	186	65	13

Air Transport

Air transportation was early introduced into the entire Far Eastern 509
region to overcome the great distances. The main line coming from
Moscow leads via Chita and Khabarovsk to Vladivostok. Beside the
direct line, flights are made along this stretch to the following localities:
Ulan-Ude, Chita, Nerchinsk, Mogocha, Skovorodino, Tygdinsk,
Svobodnyy, Arkhara, Birobidzhan, Khabarovsk, Bikin, Iman, Voroshilov,

509 and Vladivostok. An important line leads from Ulan-Ude to Ulan Bator in the Mongolian People's Republic with a stop en route in Kyakhta. Khabarovsk can be named as the special center of air transport. From here the air lines go the north. Regular flights are made to Komsomol'sk, Okha and Aleksandrovsk on Sakhalin, then to Ayan, Okhotsk, Petropavlovsk on Kamchatka, and Anadyr' in the extreme northeast. However, the air transportation also performs purely economic tasks. Thus regular flights are made to the gold fields on the upper Barguzin from Ulan-Ude and to the gold regions on the upper Vitim (Tsipikan) from Chita. Also the polar stations along the coast of the Arctic Ocean are supplied by airway. Beyond the regular lines, occasional flights are also made into the remotest regions. In the summer seaplanes are also used; they fly along the great rivers and can go down on the water at all times and everywhere. In winter, on the other hand, airplanes are used which are equipped with gliders /Gleitscheinen/ which enable the planes to land on slick ice and snow surfaces.

/195/ Tranportation of the North

489 The vastness and the slight population of the entire vast north has made it unnecessary to build routes apart from some few overland roads; and accordingly the entire area can be designated as without routes of any kind. Traffic here is accomplished within moderate limits on natural routes through the forests, on narrow paths through the mountains, and in the open tundra areas via the open plains. As a consequence of the great dampness and the heavy formation of swamps, all forms of land transportation cease in summer in many places, and transportation is then limited to boat traffic on the rivers, which during this season offer the best means of transportation. Many localities are often cut off from the outside world for weeks and months. The transportation of goods is completed primarily in the winter, which constitutes the main traffic period for the entire north. These pathless regions begin already in the northern part of the Amur region, and in the Amgun area even reach the Amur itself. Characteristic [493] for these regions is the sled as the main means of transportation, while the characteristic draught animal is the reindeer or dog, or less commonly the horse. These are means of transportation such as have been developed by the native Tungus and Paleoasiatics; and they have to be used also by the Russians for trips and for the transport of goods, because in the present state of development there are just no other possibilities for transportation.

possibilities for transportation.

The sleds are very lightly built and represent true works of art. 493 The extraordinary performances in building such a "narta," as the sleds are named, consists in the fact that the only tool employed is a knife. No nails or glue are used; only simply cut wooden pegs and straps. There results from this an extraordinary elasticity, which also comes from the birch wood which is the primary material used. The type of narta for dogs is usually 2.70 to 3.00 meters long, 50 centimeters high, and 60 centimeters wide. In the runners, which are approximately 10 centimeters wide and 3 to 4 centimeters thick, there are on either side supports, which have cross-connections. On these connections thin boards are fastened lengthwise, and these boards form the floor of the narta. The front and back ends of the runners are bent up high and attached to a horizontal wooden arc, which has the same height as the boards and which forms the outer edge of the narta. The pulling straps are fastened to the front arc. The traveler either sits sideward on the narta with his legs hanging down or lies down on the sled with his legs stretched out behind him. The narta 492 has 11 to 15 dogs put to it, the number of dogs always being uneven. At the head runs the lead dog, who understands the orders of his master, who is clever, who is distinguished by his good orientation. Rescue from some danger in the vast widerness is often due to the lead dog. The other dogs are tied in pairs to the drag line. The dog wears the pulling strap around his neck, but the strap is so arranged that the dog pulls with his chest. In order to prevent wear by rubbing /196/ the straps are wrapped in fur. So that the individual dog can't break loose sideways, each dog wears in addition a neck band which is likewise fastened to the pulling line with a light chain or a strap. A freight narta can be loaded with 2.0 to 4.5 centners. Lighter narta, which serve passenger traffic more, can as a rule not be loaded with more than 2.5 centners including the weight of the traveler. A narta with a load generally covers 4 to 6 kilometers in an hour, but with only one traveler and a team of 13 to 15 good dogs a narta can cover 10 to 12 kilometers, indeed even up to 16 kilometers in an hour. With one and the same team of dogs one can with good care cover a stretch of 500 kilometers without needing to take very long rests. Castrated dogs are usually used as draft dogs; female dogs are used only rarely since they often get sick and have only slight endurance.

Of greatest importance for the carrying out of a trip is the sled leader, the "kayur," He is no driver in the usual sense. Either he stands with one leg on the sled runner and lets the other leg dangle in

492 in the air, or he constantly runs along beside the dogs, getting their harnesses in order or helping the dogs pull the narta up a hill. He is almost constantly in conversation with the dogs, whom he spurs on with flattery or also scolding words. The dogs love to be talked to. The kayur knows his dogs and his dogs know him. It is very difficult to travel with strange dogs.

The dogs are guided only by the words of the leader or with the help of the "ostol," a 1 to 1.5 meter long birch stick. Very very seldom is this stick used to spur the dogs on. Sometimes the ostol is used to prop the narta, sometimes it is used to stop the sled in order to avoid a collision with a tree. In the forest the kayur must always be on the lookout that a bird or a wild animal does not jump out from between the trees and frighten his dogs. Then the dogs rush away, and the traveler, if he falls off the sled, is lost in the vast wilderness.

A light type of narta is used as a reindeer sled in the entire coastal area of the east. These sleds differ substantially from the [493] clumsy, heavy sleds of the Samoyed. In type of construction and in lightness this reindeer sled is like the dog sled, only the reindeer sled is higher, wider, and shorter. Usually only two reindeer are used on light trips, and in such a case the pulling line is not fastened to the front bow of the sled but rather is only drawn through it so that the two animals are forced to use the same strength in pulling. A narta with two reindeer put to it carry a load of 4 to 5 centners. For the transportation of yurts or heavy burdens large nartas are used, which are pulled by 3 or 4 or even more animals and which can carry loads of 8 to 10 centners.

Under the same conditions the reindeer narta is as a rule preferred for longer trips, since the animals provide for themselves en route, while /197/ food for the dogs, fish as a rule, has to be taken along. Travel is very difficult with loose, deep snow since the animals sink into the snow and cannot go forward. In such cases the kayur goes ahead of the sled on broad Koryak snowshoes in order to tread down a path for the draft animals--dogs and reindeers.

A trip with a narta does not belong among the pleasures of life, as a trip by sled is depicted by the European. The trip is full of anguish when the land is uneven or when the wind has covered the plains with hard snowbanks. The narta is often thrown over, the kayur who wants to help falls down, the dogs whimper and howl because they are caught under the narta, the waving back and forth and the hard bumps cause headaches and nausea.

In mountain areas where only narrow, often steep paths are available, the beast of burden shows his real value. Only the horse is used as such; the reindeer is used very rarely since it has a backbone that is too weak and is not suitable as a draft animal. The reindeer is very rarely used as a riding animal and then only by the Lamut. The saddle is up in front on the reindeer; thus the rider sits directly over the reindeer's front legs. 492

Recently the horse has been adopted more and more on Kamchatka and also on the coast of the Sea of Okhotsk, and here and there it has already displaced the dog as the draft animal.

In summer, traffic in the entire north goes into the land from the coastal localities to which the coastal steamers make runs. The distances, therefore, are not so great, and the rivers make possible a further penetration into the interior. 489

The Kolyma has acquired a special significance in this connection; it is regularly traveled every summer to supply the gold districts. To be sure, the period when the river is navigable lasts only approximately three months. If, however, the entire coastal strip is covered with ice in winter and entire sections of the sea become ice wastelands, then the old means of transportation--dog sleds and reindeer sleds--still come into their right even today.

Sea Transportation and Ice Conditions along the Coast

The extensive coasts of the Far Eastern regions are above all designed for sea transportation. This applies primarily to the entire coast north of the mouth of the Amur; the localities along this coast have only a very slight economic hinterland behind them or no such hinterland at all, and, therefore, in their development, indeed in part even in their obtaining supplies, these localities have been dependent on the sea route alone, which for most of them signifies the sole connection with the outside world. But the coastal localities of the Sikhote-Alin', too, have no built-up and easily passable land routes over the mountains to the thickly populated Ussuri-Khanka depression, and, accordingly, an exchange of goods for these localities is likewise only possible by the sea route. With /198/ this striking importance of sea transportation it is understandable that the Soviet Union has striven with all its powers to build up and to develop sea transportation. Unfortunately, as has already been brought out in the discussion of the climatic conditions, nature is not favorable to sea transportation on 505

505 the entire Far Eastern coast. Nature has through winter ice barriers drawn an often very narrow limitation, in terms of time, on the usefulness of the sea route.

132 On the Sea of Japan freezing of the coast and freezing over of the rivers occurs relatively early along the Soviet Russian coast in the entire area north of 42° latitude as a consequence of the cold winds coming from the continent. The harbor of Vladivostok, however, [504] can be used all through the year. To be sure, the "Golden Horn" freezes over in the second half of December, and the ice covering remains until into the second half of March, but the ice is not so thick that a path cannot always be made by ice-breakers for the incoming and outgoing ships. Even here, however, the undisturbed ice can attain a thickness of up to one meter.

Far more unfavorable are the conditions in the Gulf of Tatar, which separates Sakhalin from the mainland. In the southern part the ice distribution and with it the accessibility of the coast depends on the prevailing winds. With persistent northwest winds the ice piles up on the western coast of Sakhalin; with east and southeast winds, on the other hand, the ice is driven toward the mainland coast. North of 51° latitude the ice covering is thicker; there the gulf is covered by a closed ice covering throughout approximately 125 days a year, and passage is free only at the beginning of May. The individual bays, however, on which the coastal towns lie, are closed over earlier and also remain shut off by ice longer. The Amur at Nikolayevsk has an ice covering for a mean of 184 days. The table appended to this chapter gives details on this.[1]

As a consequence of the northwest winds which set in already in September and especially in October, the Sea of Okhotsk comes under continental influence early. At the end of October and in the first half of November ice formation begins along the northern coast. The thickness of the ice grows until into March, persists through April, and only in May does the disintegration of the ice begin. Almost at the same time the breaking up of the ice also begins, at first at the mouths of the rivers and then along the coast. This type of breaking up fosters the destruction of the solid coastal ice, which is then further broken up by the wind and battered by the waves. As a consequence of the current the ice is driven toward the west and southwest and collects in Udskaya Bay and at the Shantar Islands in the southwestern corner of the Sea of Okhotsk. As a consequence of this the ice persists the longest in these places. Even in July large ice fields can be

[1] [cf. pp. 231-232--Analyst]

encountered there. Thus the steamer 'Tula' ran into extensive drift-ice fields between the mouth of the Amur and the Ayan between the the 20th and 28th of July, 1916. It /199/ /Sketch Map of the Highest Level of Ice Distribution/could neither get into Udskaya Bay nor sail toward Nikolayevsk on the Amur and had to return to Vladivostok via La Perouse Strait with its load without having reached its goal. Equally noteworthy is the fact that on January 20, 1940, the merchant steamer 'Igarka' was able to reach Ayan without impediment and without the aid of icebreakers. It was the first attempt at a winter trip in this territory. On the return journey, however, the ship became locked in heavy ice and required the icebreaker 'Krassin' to free it. Apart from the southwest corner and the northwest bays /200/ the Sea of Okhotsk is generally ice-free in June. The bays on the north coast are already completely blocked by solid ice by the end of November. This solid ice covering then grows all along the coast farther into the sea. Penzhina Bay provides one exception to this rule. The formation of a solid ice covering is prevented at Penzhina Bay by a tidal current with a tidal hub /Tidenhub/ of up to 12 meters. Heavy pack ice masses thus collide. The ice lasts both here and in the neighboring Gizhiga Bay until the middle of July.

The ice conditions appear to be most favorable on the western coast of Kamchatka. The northeast and east winds break up the ice near the coast and drive it into the sea. Even in the middle of winter a strip of ocean is kept open in the vicinity of the coast, while at a greater distance from the shore heavy masses of ice remain fixed throughout the entire winter.

The passages between and the coasts of the Kurils, which lie between Kamchatka and the Japanese Hokkaido, are stopped up with drift ice from January to the end of March when the winds are from the west and northwest, but otherwise they are passable: the farther to the south the easier the passage. Often drift ice between the southern Kurils is driven out far into the Pacific, where drift ice can be encountered in May and even into June if the winter has been especially harsh.

The eastern coast of Kamchatka, in so far as it belongs to the Pacific Ocean, has no ice formations which interrupt ship traffic. To be sure there is drift ice everywhere, but this collects into larger masses of pack ice only on the sand banks in the vicintiy of the coast. Solid ice forms in the bays--for example, in Avacha Bay, on which Petropavlovsk, the capital of Kamchatka, lies. However, the ice

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Sketch Map of the Highest Level of Ice Distribution:

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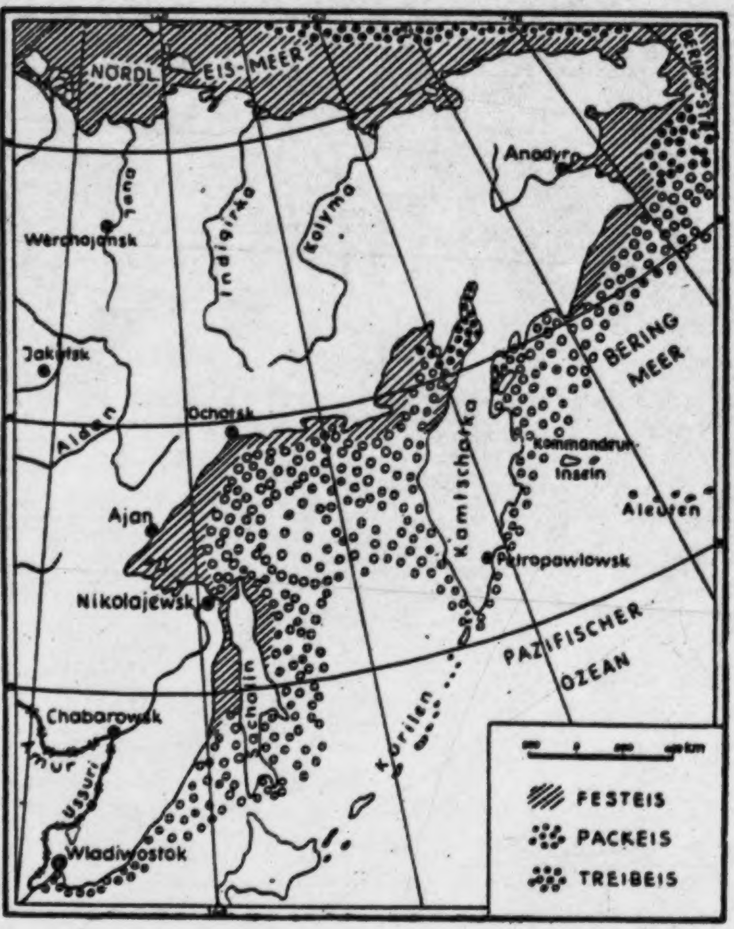
NÖRDL. EIS-MEER
BERING-STR.
Anadyr
Jana
Werchojansk
Indigirka
Kolyma
Jakutsk
BERING MEER
Aldan
Ochotsk
Kommandeur-Inseln
Aleuten
Ajan
Kamtschatka
Petropawlowsk
Nikolajewsk
PAZIFISCHER OZEAN
Sachalin
Chabarowsk
Amur
Ussuri
Kurilen
Wladiwostok
km
FESTEIS
PACKEIS
TREIBEIS

▨ Solid ice

∴ Pack ice

° Drift ice

covering, which lasts here from the middle of December to the beginning of April is not thick, and it can be kept open at all times with the help of icebreakers.

In the Bering Sea the ice difficulties along the coast increase toward the north. Heavier solid ice forms in the bays and on the coast, the drift ice lasts longer and increases in thickness and strength. Litke Strait between Karaginskiy Island and Kamchatka is stopped up with drift ice from the end of December to the middle of May, but between the mainland and the island it freezes over only very rarely. This was the case in 1918-19, and, accordingly, the Koryak population of the island could reach the mainland with their herds via the ice covering at the beginning of March, when the shortage of fodder for their reindeer was too great. Korff Bay, on which coal is mined, is closed by ice from the beginning of December to the end of April. The coast between Olyutorskoye Bay and the Anadyr' Gulf as a rule has a belt of solid ice and pack ice stretching out in front of it from November to May. The Anadyr' Gulf itself freezes over in the second half of November and remains closed until the beginning of May. Drift ice lasts still longer. In Provideniya Bay the first ice appears already /201/ in September, but only at the beginning of November does the solid ice covering close up. In the course of the winter this ice covering reaches a thickness of 3 to 4 meters.

In the open part of the Bering Sea in the north light drift ice appears already in mid-October. According to the reports of American whalers, a solid ice covering forms around St. Lawrence Island at the end of December. Drift ice has been determined here until the end of July. In the southern part of the Bering Sea there is seldom impeding ice. In the sphere of the Commander Islands the sea as a rule does not freeze over. In the northern part of Bering Sea the movement of ships is generally possible from the end of May to the middle of October; in Bering Strait, however, it is possible as a rule only from the middle of June to the beginning of October. In the beginning of November the sea in the area of the Bering Strait is covered with heavy pack ice. According to some reports, the sea between Cape Dezhnev, the Diomede Island and Cape Prince of Wales is so extensivley frozen over from February to March that traffic over the ice is possible between the Chukchi Peninsula and Alaska.

Ice conditions in the northern part of the east Siberian coast are most favorable for shipping in August and September. The western part of the Chukchi Sea and the eastern part of the East Siberian

Sea--i.e., the regions on both sides of the Long Strait--generally offer the greatest difficulties for shipping. Ice formation sets in the end of September to the beginning of October, beginning first in the areas near the coast, where the salt content of the water is lowered by the rivers emptying into the ocean. From the coast the ice then grows out into the sea, forming an uninterrupted ice covering by the end of November to the beginning of December. This solid ice stretches in winter to approximately the line where the ocean becomes 25 meters deep, and, accordingly, the width of the ice fluctuates considerably depending on the depth conditions. At the new Siberian Islands the ice extends from the coast out into the sea beyond these islands and, being 350 kilometers and more wide, it attains here the greatest width in the Arctic. Approximately the beginning of April the first signs of the breaking up of the ice appear. In May and June there is an active formation of splits. As the season progresses the great ice fields become smaller and smaller and finally become ice floes, between which a ship can go. The farther to the east one goes the later the breaking up of the ice begins; in the Chukchi Sea it usually does not begin until July. The deeper parts of the North Polar Basin are covered with Arctic pack ice, which toward the end of winter has a thickness of 3 to 3.5 meters. In the course of the summer this sinks to 2 to 2.5 meters. Through tidal currents, surface currents, and the effects of the wind, strains and pressings occur, which lead to a pressing together and with this to the formation of pack ice, whose height in places can reach 10 meters and more. Since the water movement on the shelf as a rule is toward the east, while over the deeper water the movement is directed toward the west, holes in the ice often appear in the border zones, forming here large splits, which at times can be traveled through. These split zones, which are called "polynia" (= ice-free places) by the Russians, /202/ extend from west to east through the entire Arctic part of the sea. In the Chukchi Sea it often appears right on the coast. With a north wind these ice-free areas disappear completely. The Arctic pack ice then grows together with the solid ice of the shelf. If the wind changes suddenly, then the pack ice is driven toward the north, and the polynia arrises anew. 132

As the attached table shows,[1] ice conditions in the entire coastal area of the Soviet Far East vary greatly from year to year and even change a great deal within a single year. A well expanded network of meteorological observation stations, along with an ice information 132 654

[1] [Cf. Cat. 116, pp. 231-232 -- Analyst]

132 654 service and help from ice-breakers, could very much expand the usefulness of the parts of the sea threatened by ice. And here the Soviet government has accomplished excellent work worthy of recognition.

505 The center of all the coastal traffic is Vladivostok, from which all lines start. Sea traffic is most active in the most southerly part of the coast as far as Nikolayevsk on the Amur. However, the more northerly localities are also visited regularly several times a year. The longest line leads to the mouth of the Kolyma, whence a trip by one or even several steamers at the same time is undertaken every year. Of the 2, 021, 000 tons of goods turned over in the harbor of Vladivostok (1935), 864, 000 tons came from coastal traffic.

The following figures on distances may explain transportation conditions:

Coastal Steamer Lines

Distances from Vladivostok

Sovyetskaya Gavan'	1, 075 kilometers
Aleksandrovsk on Sakhalin	1, 335 kilometers
Nikolayevsk on the Amur	1, 575 kilometers
Okhotsk	3, 210 kilometers
Petropavlovsk	2, 785 kilometers
Anadyr'	4, 640 kilometers
Mouth of the Kolyma	5, 200 kilometers

(Next table on following pages)

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/205/ B. SPECIAL SECTION

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/207/ THE PROVINCES

General Division

133 As the general survey has already shown, the geographical conditions of even a large division of the entire region fall into [1]

[1] [Cf. cat. 133, p. 232 for continuation — Analyst]

/203/ Dates on the Freezing Over and the Opening Up of the Sea on the coasts

	Final Establishment of the Ice		Final Becoming free of Ice		Mean number of Days with Ice*
	Earliest	Latest	Earliest	Latest	
I. Sea of Japan and the Gulf of Tatar					
Bay of Peter the Great					
At Cape Gamova	19 Jan.	18 Feb.	3 Mar.	29 Mar.	72
At Askol'd Island	19 Dec.	3 Feb.	26 Feb.	24 Mar.	59
Golden Horn	10 Dec.	30 Dec.	15 Mar.	24 Mar.	90
Amur Bay	18 Nov.	30 Dec.	11 Apr.	28 Apr.	130
Ussuri Bay	27 Dec.	15 Jan.	14 Mar.	30 Apr.	85
Sea at Cape Povorotnyy	1 Feb.	4 Feb.	26 Feb.	14 Mar.	--
Ol'ga Bay	17 Dec.	4 Jan.	27 Mar.	12 Apr.	100
De Castri Bay	16 Nov.	15 Dec.	25 Apr.	21 May	152
Gulf at Cape Pronge	24 Oct.	22 Nov.	30 Apr.	29 May	185
Amur at Nikolayevsk	30 Oct.	27 Nov.	10 May	25 May	184
II. Sea of Okhotsk					
St. Nikolaus Bay	5 Nov.	17 Dec.	27 May	25 July	190
Shantar Islands	10 Nov.	81 Dec. /sic/	25 May	20 July	174
Udskaya Bay	20 Nov.	18 Dec.	27 Apr.	10 July	178
Sea at Ayan	25 Nov.	22 Jan.	20 May	26 Feb. /sic/	164
Sea at Okhotsk	27 Nov.	26 Jan.	19 Mar.	18 May	117
Yamskaya Bay	12 Nov.	18 Dec.	21 May	28 June	185
Gizhiga Bay	27 Nov.	30 Dec.	25 May	2 June	136
Penzhina Bay	9 Nov.	12 Dec.	5 May	2 July	188
III. Bering Sea					
Avacha Bay	20 Nov.	7 Jan.	10 Mar.	9 May	115
Side bay of Avacha Bay	19 Nov.	16 Dec.	11 May	5 June	170
Ukinskaya Bay	14 Nov.	8 Jan.	15 Mar.	22 June	128
Korff Bay	15 Nov.	30 Dec.	18 Apr.	16 June	160
Olyutorskiy Bay	25 Nov.	30 Dec.	10 Apr.	10 June	149
Dezhnev Bay	8 Nov.	25 Dec.	29 Apr.	15 June	170
Anadyr' Gulf	12 Nov.	5 Dec.	29 Apr.	9 July	190
Holy Cross Bay	30 Oct.	18 Dec.	25 Apr.	18 July	195
Provideniya Bay and Emma Harbor	24 Oct.	26 Nov.	2 June	16 July	220

(table continued on following page)

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	Final Establishment of the Ice Earliest	Final Establishment of the Ice Latest	Final Becoming free of Ice Earliest	Final Becoming free of Ice Latest	Mean number of Days with Ice*
Cape Chaplin	27 Oct.	8 Nov.	20 June	15 July	240
Sea south of Markovskaya Bay	25 Oct.	28 Nov.	12 June	27 July	230

* The mean number of days with ice includes drift ice and established ice.

133 individual natural areas. In the following consideration these natural areas are again divided into individual provinces, with the relief serving as the principal basis for the division. Given the size of these individual provinces it is obvious that in addition to many common traits in a given province there are also differences in the individual parts of the province. Accordingly, a further subdivision could be carried out without difficulty. However, this has intentionally been forgone for reasons of clarity.

The varying treatment of the individual provinces and their parts is a consequence of the uneven knowledge of many parts of the land. In going through the Russian literature, one can again and again determine that in addition to well-known regions there still exist extensive areas which require exact investigation. In contrast to the individual research prevailing in the Czarist period, Soviet Russian science has gone over more to a systematic penetration. However, with the great size of the entire land, much still remains to be done.

Transbaykal is divided by the Yablonovyy Ridge into two provinces: according to Obruchev, these can be designated as the western or Baykal province and the eastern or Nerchinsk Daur province. Toward the north the individual mountain ridges come together to form extensive plateau areas. To this category belongs the Vitim Plateau, which is grouped as a unit with the mountain forest areas adjoining it to the north and equipped with an equally raw climate. The mountain country between Vitim and Olekma and the Olekminsk Stanovik contitute the transitional area to the actual Amur country. Here the Zeya and Bureya mountain country marks the border of the economically important Zeya-Bureya plain. Again accompanying the lower Amur is a depression, which flows together with the Amgun area. The Sikhote-Alin' and the Ussuri-Khanka depression constitute individual

133

provinces of the Ussuri country. The division of the remaining regions follows of itself: the island of Sakhalin, the region of the Amgun and Uda, the Okhotsk coastal country, the provinces of the extreme northeast and of Kamchatka Peninsula (see map). A short survey of Lake Baykal precedes the description of the provinces.

/208/ Lake Baykal

Adjoining Transbaykal on the west is Lake Baykal, which belongs among the most interesting lakes in the world. It has a water surface of about 23,000 square kilometers, a length of 636 kilometers, and its greatest width is 79 kilometers. The smallest width, between the mouth of the Buguldeyka and the delta of the Selenga, is only 25 kilometers. The lake lies on the mean at 453 meters above sea level, but the lake floor sinks down 1,741 meters, thus reaching 1,288 meters below sea level and so making Baykal the lowest internal lake in the world. The mountains right on the shore rise more than 2,000 meters, and, as a result, there are height differences of more than 3,700 meters within a very small area. From this the tectonic formation of the lake can also be recognized. This occurred through the inroads of four grabens shoved approximately toward one another; of these grabens, the most southwesterly one runs in the Sayan direction and the others, on the other hand, run in the Baykal direction. This explains the long swung, arc-shaped form of the lake basin. In terms of time the formation of Lake Baykal was related to the graben breaks of Transbaykal and must have occurred after the middle Tertiary. The lake acquired its present form and shape in the time between Pliocene and Quarternary.

The temperature of the water is extraordinarily cool, and even 133
in August, which brings relatively the highest temperatures, it never 132
exceeds 9° to 10°. In the vicinity of the shore the surface water is somewhat warmer, and only in some bays, which are favorably located, does the water temperature rise to 15° to 19° at the highest. From a depth of 255 meters on the water temperature remains approximately constant at 3.5°. At a depth of 900 meters a temperature of 3.4° has been recorded, and at 1,600 meters one of 3° has been recorded. The frequent, very violent storms are primarily responsible for the coolness of the surface water. These storms again and again stir up the water, but, on the other hand, they also see to it that Lake Baykal freezes over only at the beginning of January. As a mean established

133 over long years, Lake Baykal remains for 116 days under a solid ice
132 covering, which can attain a thickness of up to 1.25 meters.

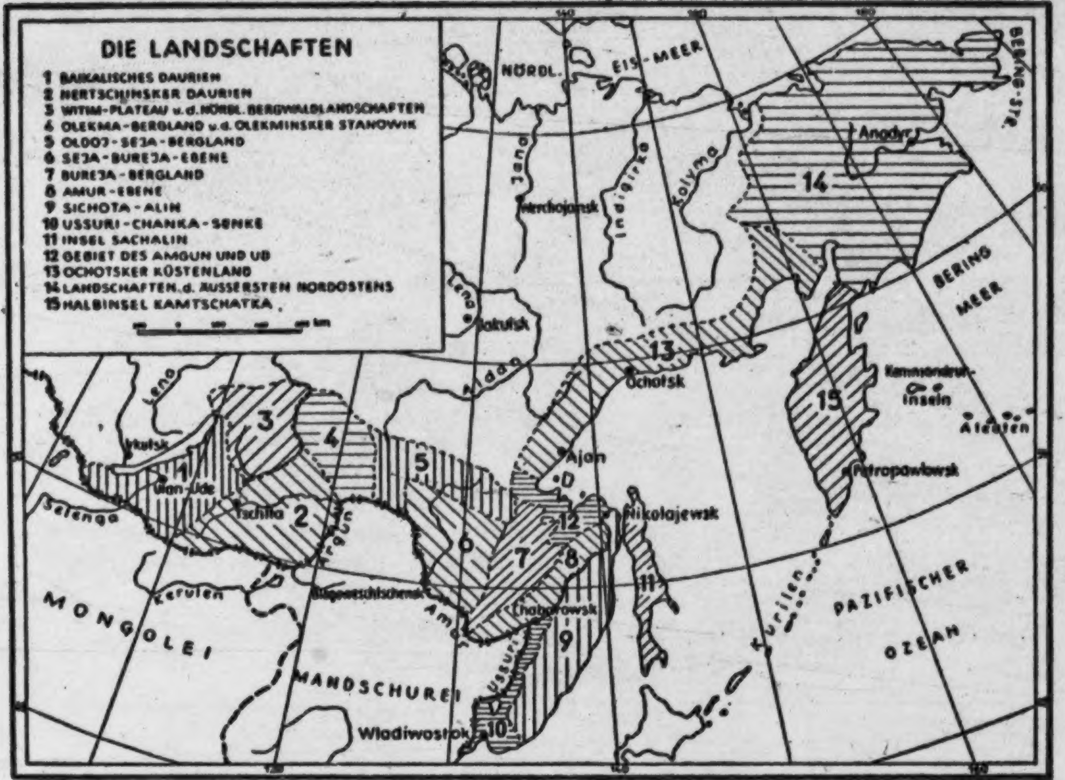
The fauna of the lake[1] is peculiar, representing a true collection
136 of endemic forms. Of the 1,000 types determined so far, around 75 percent are endemic. Here in the middle of the continent there is a type of seal called "nerpa" by the Russians (Phoca sibirica), which is related both to the same type found in the Arctic Ocean (Phoca hispida) and also to one found in the Caspian (Phoca caspia). The next fauna worthy of mention is the small, viviparous spider fish (Callionymus baicalensis), whose family (Comephoridae) is peculiar only to Lake Baykal. Exceedingly large is the number of mollusks. To date 85 types have been determined, of which two endemic families of brachiopods (Benedictiidae and Baicaliidae) are typical fresh water representatives. The great age of the Baykal fauna, which must have followed an isolated development, indicates the /209/ /Sketch Map of the Provinces// /210/ appearance of the Baicalia mollusks already in the fresh water deposits of the lower Cretaceous in Transbaykal.

As a result of its depth and its favorable natural landing places,
505 Lake Baykal offers the best opportunities for water transportation. A steamer line which is traveled regularly, connects all the larger settlements with one another and also serves the transportation of goods. Wood constitutes the bulk (40 percent) of the goods transported, in second place are stones and building material (30 percent), then follow fish, salt, flour, and others. The wood as a rule is floated down the rivers to the lake and then is transported by steamer tugs to the mouth of the Angara, where it is transferred to the railroad in Baykal station, which is equipped with mechanized loading equipment, or a small part of it is floated directly to Irkutsk. Wood is delivered on the Transbaykal side primarily by the river areas of the Barguzin and the Upper Angara.

Also of economic significance is fishing, which is pursued
228 both in the open sea and also in the bays. The principal role in this fishing is played by the catching of a type salmon, the omul (Coregonus omul Pall. or Coregonus migratorius), and of fish related to the omul: these fish constitute 58 percent to the catch. In second place are types of carp (22 percent), which are caught primarily in the lagoons and in neighboring lakes. Also the catch of seals, already mentioned, is not insignificant. In 1948 there were 1,380 animals caught. Fishing is pursued both by the state and also by fishing kolkhoz. The latter caught 68 percent of the total catch in 1949, while the state was

[1] [i.e. Lake Baykal -- Analyst]

Sketch Map of the Provinces: (Captions to map on following page)


DIE LANDSCHAFTEN
1 BAIKALISCHES DAURIEN
2 NERTSCHINSKER DAURIEN
3 WITIM-PLATEAU u.d. NÖRDL. BERGWALDLANDSCHAFTEN
4 OLEKMA-BERGLAND u.d. OLEKMINSKER STANOWIK
5 OLDOJ-SEJA-BERGLAND
6 SEJA-BUREJA-EBENE
7 BUREJA-BERGLAND
8 AMUR-EBENE
9 SICHOTA-ALIN
10 USSURI-CHANKA-SENKE
11 INSEL SACHALIN
12 GEBIET DES AMGUN UND UD
13 OCHOTSKER KÜSTENLAND
14 LANDSCHAFTEN d. AUSSERSTEN NORDOSTENS
15 HALBINSEL KAMTSCHATKA
km
NÖRDL. EIS-MEER
BERING-STR.
Anadyr
14
Jana
Werchojansk
Indigirka
Kolyma
BERING MEER
Lena
Jakutsk
13
Ochotsk
Aldan
Lena
Kommandeur-Inseln
15
Aleuten
3
4
5
Irkutsk
1
Ajan
Petropawlowsk
Ulan-Ude
Selenga
Tschita
2
12
Nikolajewsk
Argun
6
7
8
11
Kerulen
Blagoweschtschensk
Amur
Chabarowsk
MONGOLEI
9
PAZIFISCHER OZEAN
Kurilen
Ussuri
MANDSCHUREI
Wladiwostok
10
140
160
180
120

3: Thiel-235 K-4,5(no date) 1953 RRI Siberia RRI

133

(Captions to Map on page 235)

1. Baykal Daur
2. Nerchinsk Daur
3. Vitim Plateau and the northern mountain forest provinces
4. Olekma mountain country and the Olekminsk Stanovik
5. Oldoy-Zeya mountain country
6. Zeya-Bureya plain
7. Bureya mountain country
8. Amur plain
9. Sikhote-Alin'
10. Ussuri-Khanka depression
11. Sakhalin Island
12. Area of the Amgun and the Uda
13. Okhotsk coastal area
14. Provinces of the extreme northeast
15. Kamchatka Peninsula

responsible for 32 percent. On the Transbaykal side, in the area of 228
the Buryat-Mongol ASSR, approximately 30,000 double centner of
fish are caught annually; in good years even more than 35,000 double
centners of fish are caught. Thus a series of fishing settlements animate
the Transbaykal shore. The most important are Nizhne-Angarsk, 361
which lies on the extreme north east tip, Ust'-Barguzin at the mouth [255]
of the river of the same name, where there is also a fish canning
factory, and, south of this, Goryachinsk, which in addition to fishing [312]
is acquiring a growing importance as a health resort because of its hot
springs.

Baykal Daur

Baykal Daur begins in the west with the Khamar-Daban. This 133
mighty mountain massif, projecting up to 2,217 meters, follows the
southern shore of Lake Baykal. Along this shore, runs the railroad
which encircles Lake Baykal and which is forced to follow all its
windings. This mountain massif is little divided and has predominantly
soft forms with dome-like heights which are seldom rocky. These
heights, as Prassolov describes them (160), give the impression of being

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160. Prassolov, L.I. Iuzhnoe Zabaykaliye /Southern

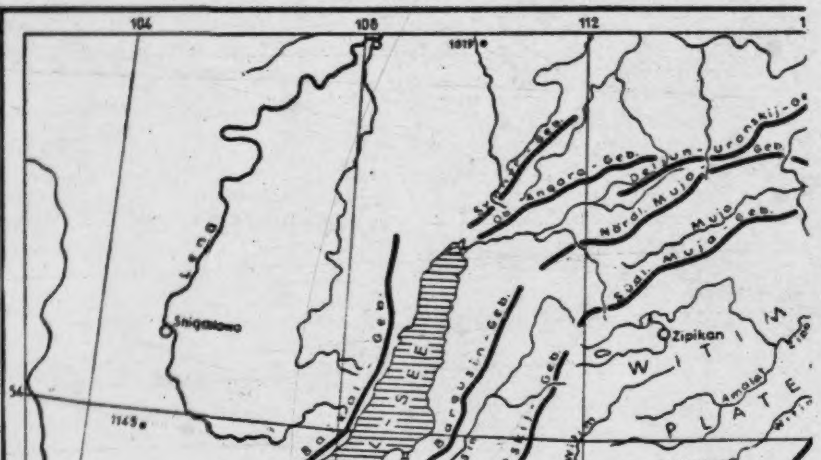
133 Transbaykal/. Material for Doing Research on the Ground in Asiatic Russia. Moscow, 1927.

flat steps, heaped up on one another; they appear easy to climb from the south but break off sharply toward Baykal. However, sharp ridges and pointed, pyramid-shaped mountains appear in the western part, especially in the area of the upper course of the Temnik and the Snezhnaya. Here also lie /211/ /The page itself is blank. Attached to it, however, is a sketch map of Transbaykal: Orographic Scheme/[1] /212/ the greatest projections of an Alpine type, rich Karbildungen /Karformations/, and other traces of a former glaciation. The bulk of the mountain range has a width of 40 to 70 kilometers and heights of only between 1,200 and 1,600 meters. But the saddles and passes are only 200 meters lower. Outcroppings of basic stone, principally gneiss and granite, occur mostly only on the lower parts of the slopes. The southern and eastern parts present a motley geological picture. Represented here primarily are crystalline limestone and other matamorphic rock, then porphyrite and basalt. In the Khamar-Daban radioactive materials have been determined in addition to other minerals. [134] The bulk of the mountain range is covered with thick forests. Only a few bare gol'tsy project beyond these forests in the eastern part, and only higher Alpine forms project beyond the tree line in the western part. The composition of the forests is strongly influenced by climatic conditions. On the slopes inclined toward Baykal and exposed to the damp and cool northwest winds there is typical Siberian taiga with larches, Siberian stone birch, pines, and others. On the dry southeastern slopes, on the contrary, pines predominate almost exclusively. The flat ridges are covered by an underwood and bush formation.

The Khamar-Daban is separated from the Borgoyskiy Mountain Range on the south by the valley of the Temnik, which flows down to the Selenga. The Borgoyskiy Mountain Range runs parallel to the Khamar-Daban and generally has the same character except for the fact that toward the south it is more heavily broken up /zergliedert/ and with wide, open valleys declines to the extensive graben depression of the Dzhida. In contrast to the Khamar-Daban and the Borgoyskiy Mountains, which are difficult to traverse and not very attractive because of their forest wilderness, the Dzhida valley is relatively well opened up. This goes back to the valley's valuable natural resources. [135] In the area around the upper course of the river there is, in addition to coal, rich supplies of wolfram and especially of molybdenum. These deposits can be reckoned among the richest in the Soviet Union.

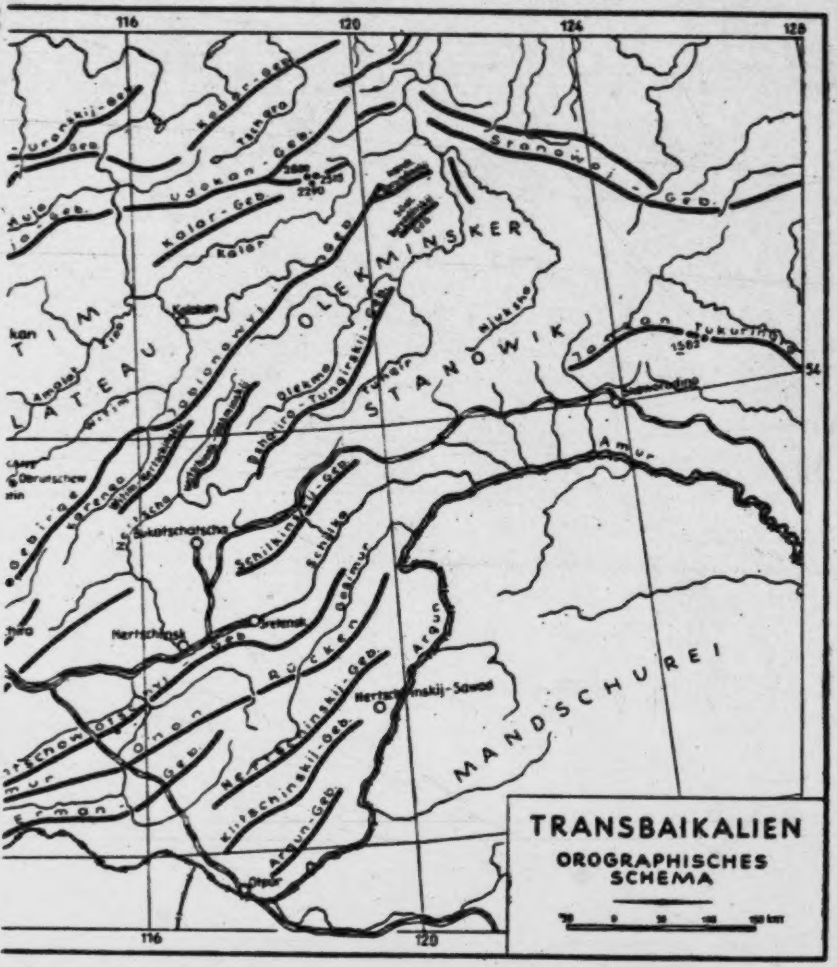
[1] [cf. pp. 238-239--Analyst]

Section A.


104
108
112
54
56
1819
Lena
Shigalowo
1145
Baikal-Geb.
BAIKAL-SEE
Primorskij-Geb.
Irkutsk
Barguzin-Geb.
Barguzin
Ikatskij-Geb.
Turka
Ulan-Burgassy
Kurba
Sy...-Geb.
Ob. Angara-Geb.
Deljun-Uranskij-Geb.
Nördl. Muja-Geb.
Südl. Muja-Geb.
Muja
Zipikan
WITIM PLATEAU
Amalat
Witim
VULKANE
Muschketow
Obrutschew
Lopatin
1576
Jablonowyi-Gebirge
Karenga
Tschita
Udo
Chudunskij-Geb.
Tsagan-Churtej
Chamar-Daban
Ulan-Ude
Tsagan-Daban
Saganskij-G.
Chilok
Malchanskij-Geb.
Oshidinskij
Ingoda
Tscherskij-Geb.
Daurisches Gebirge
Borschtschowotschnyi
Gasimur
Erman
Onon
2118
2058
2508
Tschikoi
Selenga
Kjachta

Sketch Map of Transbaykal: Orographic Scheme.

133


TRANSBAIKALIEN
OROGRAPHISCHES SCHEMA
116
120
124
128
54
Uronskij-Geb.
Kodar-Geb.
Tschara
Udokan-Geb.
2500
2250
2290
Muja
Geb.
Kalar-Geb.
Kalar
Stanowoj-Geb.
OLEKMINSKER
STANOWIK
Njukscha
Jankan
Tukuringra
1582
Jablonowyj-Geb.
Kalakan
PLATEAU
TIM
Amalat
Witim
Olekma
Tungir
Tungirskij-Geb.
Tschara-Tungirskij
Sokatschatscha
Schilkinskij-Geb.
Schilka
Gasimur
Nertschinsk
Sretensk
Jablonowyj
Rücken
Argun
Nertschinskij-Sawod
Onon
Nertschinskij-Geb.
Klitschinskij-Geb.
Argun-Geb.
Amur
MANDSCHUREI
Karenga
Obrutschew
Olowjannaja

Sketch Map of Transbaykal: Orographic Scheme.

deposits can be reckoned among the richest in the Soviet Union. Thus, 133 here in the middle of a remote wasteland a small industrial area has [361] come into being, whose center is the town of Gorodok and which already has more than 10,000 inhabitants. The center is a large wolfram- [316] molybdenum works with modern mines, ore dressing installations, conveying and suspension railroads. The valley slopes here are still grown over by thick taiga. However, toward the east the forest withdraws from the lower slopes, which appear far from one another and form an extensive grass steppe area, which merges with the Selenga steppe without interruption. The valley of the Dzhida is bordered on the south by the Dzhidinskiy Mountain Range named after the river. The Mongolian border runs along the watershed of this mountain range.

The Khamar-Daban continues toward the east with dimensions which become smaller morphologically and geologically. However, the Selenga, which breaks through the mountain in a narrow valley, is usually considered to be the eastern border of the Khamar-Daban. The Selenga circumscribes the eastern part of the Khamar-Daban and empties into Lake Baykal in a broadly projecting delta.

/213/ /Sketch Map of the Buryat-Mongol ASSR:/

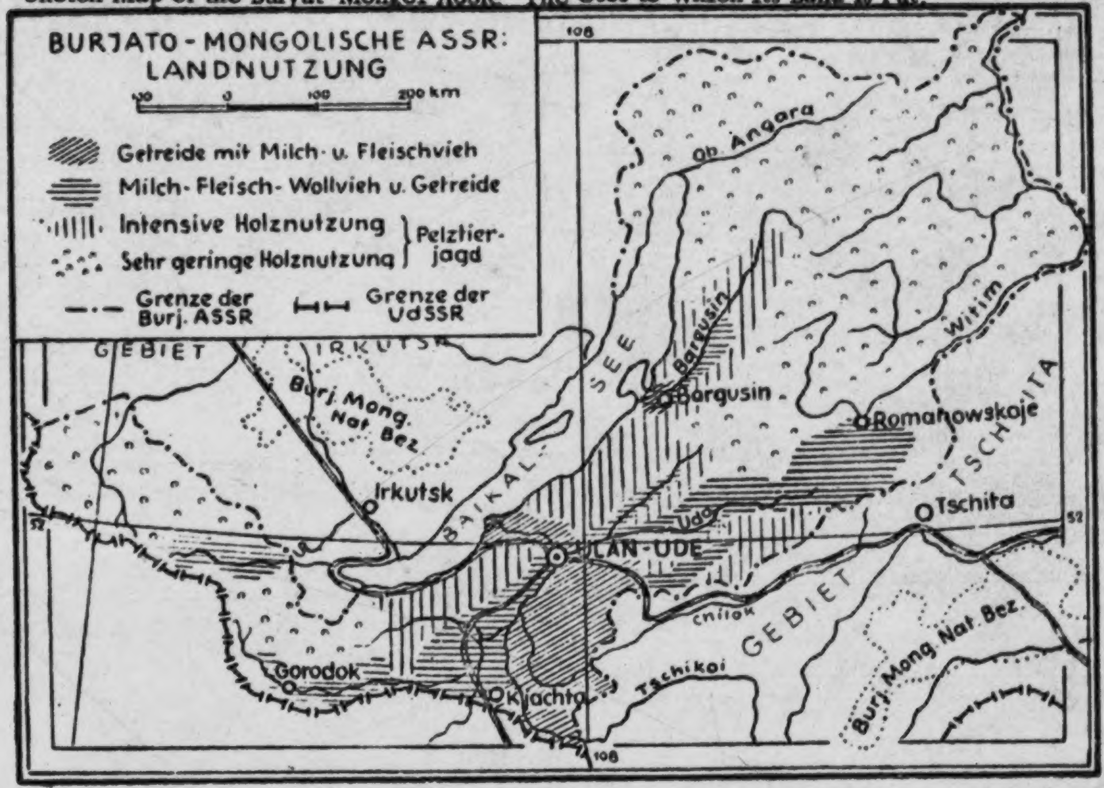
/214/ The Selenga Delta is a heaped up plain /Aufschüttungsebene/, which on the mean lies 7 to 8 meters above the water level of Lake Baykal, to which the delta slopes in terraces. The lower terrace, which already bears sea deposits, is completely flat, while the remaining parts are gently rolling. The northeast, the real present-day delta, is traversed by numerous dead and living arms of the Selenga, while the southwest is flowed through by some tiny little rivers, which come directly from the Khamar-Daban. In terms of its landscape, the delta represents a dry steppe, in whose lower, sunken-in parts swamps are imbedded. The delta is fairly heavily populated by Russians and Buryat, who pursue both fishing and agriculture. Irrigation is used in the agriculture. The [361] center of this area is Kabansk, where the railroad coming from the west touches the Selenga for the first time. The products of the fishing are [264] stored here in modern cold storage installations and made ready to be transported away.

From here[1] the railroad uses the valley of the Selenga and reaches 361 Ulan-Ude, the capital of the Buryat Republic, above the break-through by the Khamar-Daban. The city lies on the right bank of the Selenga at the mouth of the Uda, which is navigable by rafts. In 1926 still a small, dusty steppe town with 29,918 inhabitants, Ulan-Ude by 1939 had become a modern industrial city with 129,419 inhabitants. In

[1] [i.e. Kabansk--Analyst]

3: Thiel--241 K-4,5(no date) 1953 RR1 Siberia RR1

Sketch Map of the Buryat-Mongol ASSR: The Uses to Which Its Land is Put:



BURJATO-MONGOLISCHE ASSR:
LANDNUTZUNG
100
0
100
200 km
Getreide mit Milch- u. Fleischvieh
Milch- Fleisch- Wollvieh u. Getreide
Intensive Holznutzung
Sehr geringe Holznutzung
Pelztier-jagd
Grenze der Burj. ASSR
Grenze der UdSSR
108
52
GEBIET
IRKUTSK
Burj. Mong. Nat. Bez.
Irkutsk
BAIKAL-SEE
ob. Angara
Bargusin
Bargusin
Witim
Romanowskoje
TSCHITA
Tschita
Uda
ULAN-UDE
Chilok
GEBIET
Burj. Mong. Nat. Bez.
Tschikoi
Gorodok
Kjachta

▨ Grain with livestock used for milk and meat.

▤ Livestock used for milk, meat, and wool; plus grain,

Intensive exploitation of wood, } Hunting of fur-bearing animals.

Very slight exploitation of wood }

—·— Border of the Buryat ASSR,

⊢⊣ Border of the USSR,

/218/

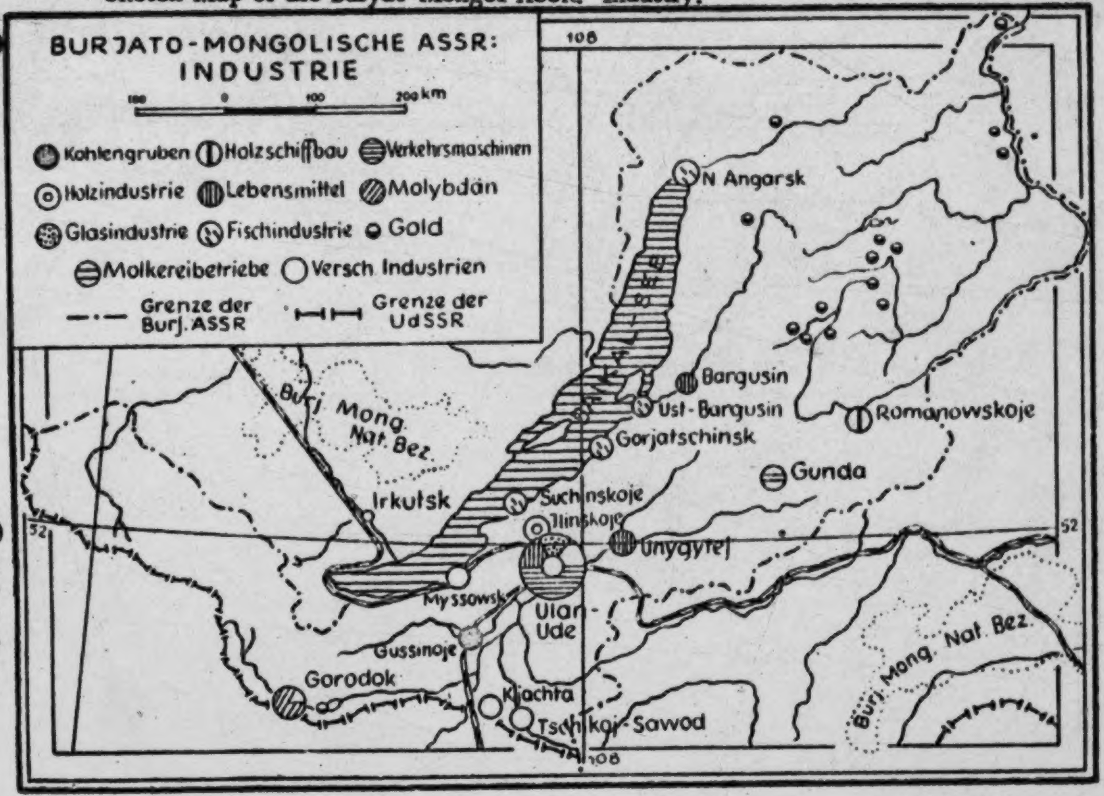
635
3/11

361 this city almost 25 percent of the total population of the Buryat-Mongol
[397] ASSR have been brought together. Ulan-Ude has the largest locomotive and railroad car factory in eastern Siberia; this factory supplies the whole Far East. Supported by the Buryat's important breeding of livestock,
[253] the largest meat factory in Siberia, which produces canned meats, frozen meats, and other preserved meat goods has come into existence. The meat plant is in a position to process 400 cattle, 1,000 sheep, and 250 pigs a day. In 1940, 25 million cans of meat were sent out. Two large
[323] glass factories make Ulan-Ude also the supply center for crockery and glass goods for the entire Soviet Far East. Lying on a river and a railroad, Ulan-Ude is favorably located in terms of transportation. At the
[396] same time Ulan-Ude is also the center of the Selenga water transportation, for which river steamers and barks are built in the city's own dockyard. Steamers not only carry traffic downstream but also carry it up the tributaries, for example on the Chikoy, which runs through agricultural regions. Of no less great importance is the floating of lumber, since the tributaries of the Selenga come from areas rich in forests. Here
[313] again the lumber streams into Ulan-Ude, where it is processed in large sawmills. Iliynsk, which lies on the Selenga 57 kilometers below the capital, is also an important wood-processing center.

133 Ulan-Ude lies at the point where the Selenga Valley unites with the valley of the Uda. As a contiguous graben depression, the two form a morphological-tectonic unit, and in their natural state, they were once a steppe. /215/ /Sketch Map of the Buryat-Mongol ASSR:/1/216/ These two valleys today are the most heavily populated and economically the most important regions in the Buryat-Mongol ASSR.

Above Ulan-Ude the valley of the Selenga soon expands into a hilly to gently rolling, pure steppe landscape, which continues over
487 the border into Mongolia. It is traversed by the old caravan road, which connects Ulan-Ude with the capital of the Mongolian People's Republic, Ulan-Bator, the former Urga. At the border crossing Kyakhta (approximately 10,000 inhabitants) lies opposite the Mongolian Atlan Bulak
491 (Chinese: Maimachen). This overland route, expanded into an auto-
496 mobile highway in the period of the Soviet Union, has since 1938 been supplemented by a railroad line, which branches from the main line at Ulan-Ude but does not follow the old road. Rather it goes around Gusinoye Lake in a western arc and reaches the border at Naushki, approximately 20 kilometers west of Kyakhta. A lengthening of this
491 railroad to Urga was carried out in 1949. A land route usable throughout the year by trucks branches off from Novo Selenginsk toward the west into the river area of the upper Dzhida.

Sketch Map of the Buryat-Mongol ASSR: Industry:


BURJATO-MONGOLISCHE ASSR: INDUSTRIE
100 0 100 200 km
Kohlengruben
Holzschiffbau
Verkehrsmaschinen
Holzindustrie
Lebensmittel
Molybdän
Glasindustrie
Fischindustrie
Gold
Molkereibetriebe
Versch. Industrien
Grenze der Burj. ASSR
Grenze der UdSSR
108
52
N Angarsk
Bargusin
Ust-Bargusin
Romanowskoje
Gorjatschinsk
Gunda
Suchinskoje
Ilinskoje
Unygytej
Irkutsk
Myssowsk
Ulan-Ude
Gussinoje
Gorodok
Kjachta
Tschikoi-Sawod
Burj. Mong. Nat. Bez.
Baikal
108
52

- ● Coal Mines
- Construction of wooden ships
- Transport machinery
- Wood industry
- Groceries
- Molybdenum
- Glass industry
- Fish industry
- Gold
- Dairy plants
- Various industries

/215/

—·—Border of the Buryat ASSR

⊢⊣Border of the USSR

3: Thiel-243 K-4,5(no date) 1953

RRI Siberia RRI

625
316
39
25
323
228
234

into the river area of the upper Dzhida.

Gusinoye Lake has the shape of an ellipse, and, having an area of 164.7 square kilometers and a maximum depth of 28 meters, it is the largest lake in Transbaykal. The present lake represents a recent formation. Even in 1720 it did not exist. In 1730 the water began to collect, coming for the most part from the Temnik, which used the Tsagan-Gol as a means of access to the depression. Around 1800 the lake already had approximately its present size. From 1810 the water began to withdraw again: the lake shrank up and numerous flat islands emerged. After 1865 a raising of the water level again set in, which gave the lake its old form again. At present a withdrawal of the water has again been determined. Gusinoye Lake lies in an area of Jurassic sandstones and conglomerates, which are interlarded with layers bearing brown coal. The Gusinoye plain continues toward the northeast and the south and is hemmed in on the west by the Khambinskiy Mountain Range and on the east by the Monostoy Mountain Range. The plain lying south of the lake bears the name of Tamchi. It owes its origin to fluviolacustrine deposits. Prassolov regards it as a delta formation of the Temnik. The main stream of the Temnik empties into the Selenga, but sends a branch, the already-mentioned Tsagan-Gol, into the lake, from whence a side river, the Bain-Gol, flows off and again leads to the Temnik. Accordingly Gusinoye Lake can to a certain extent be regarded as the Temnik's water storehouse. A slight fall in the water level is sufficient to keep any water from flowing off from the lake. The lake has fresh water and is very rich in fish.

Within the Gusinoye plain, interestingly enough, salt lakes in basins from which no water flows off and important deposits of chemical salt have formed: thus, for example, the Tsagan-Nor and the Selenginskoye Lake. The latter is 1.5 kilometers long and up to 1.8 meters deep. The hot summer furthers the concentration of salt in these lakes. Often they lie in a long extended depression /217/ within mighty layers of deposited salt with the present day lakes filling only the deepest spots with their waters. From this it can be deduced that the processes still going on in the present must have been more intensive in the past. These water basins never had a connection with the ocean either in the recent past or in the distant past; rather they are interesting examples of lakes with salt of continental origin. One collected salt which became free as a result of chemical disintegration of crystalline rock; others washed continental sediments in lye, sediments which had been enriched with salt in an older geological period. For this reason the

133 peculiarity of these lakes depends on the rock in which they are set.
If such lakes lie within eruptive stone, they are as a rule alkali, i.e.
they contain and deposit soda (Doroninskoye, Ononskoye, Borgoyskoy
317 Lake). In winter when the climate is dry, soda crystallizes out from
the frozen surface of these lakes while strong winds raise up these soda
crystals from the ice and deposit them in the immediate and distant
environs, thus fostering the mineralization both of the ground water
and also of the surface water. In order to extract soda, the soda crystals,
which look like a white tinge on the ice, are swept together; thereby
20 to 25 tons of highly concentrated soda lye can be gotten from a
hectare of ice surface. In order to foster the crystallization out of the
soda, the ice is beaten open so that the lake water comes out under its
own pressure through the openings and floods over the surface of the ice.
If the lakes lie within Jurassic sediments, then sulphate forms as a rule,
especially mirabilite. Deposited under the floor of Selenginskoye Lake
is a layer, several meters thick, of sulphate of soda, whose supply is
in millions of tons. Alginskoye Lake also belongs in this group. The
railroad from Ulan-Ude to Naushki is supposed to lead to the opening
up of the important salt deposits in the area of the Gusinoye Lake; the
brown coal deposited in the same area is supposed to serve as a basis
for this. A large sulphate plant is already in production. At the
361 Gusinoye Lake station a city with more than 10,000 inhabitants has grown
from an unimportant village. Coal mines from here supply the railroad.
In addition sawmills, brick yards, great dairies, and a fish-canning factory
have come into being there. In the fish-canning factory the catch from
Gusinoye Lake is processed.

133 The steppe regions which appear in southern Transbaykal vary
137 greatly in their economic importance. In the most southerly areas the
artemisian steppe extends over a very wide area: it extends not only
over the valley areas but also over the mountain slopes and mountains
of the mountain ranges, which here are mostly low. In its driest parts
the ground is often covered only 40 percent to 50 percent with plant
growth, and the height of the grasses scarcely reaches 15 to 20 centimeters.
These are poor meadows. Toward the north, through the thickening
/218/ of the covering of vegetation and through the increase in the
grasses, this type of steppe gradually changes into the artemisian grass
steppe, in which the grasses become 35 to 40 centimeters high. These
steppes are used as meadows in the spring and in the first half of the
summer--as long as the vegetation still hasn't withered away under the
summer heat. Both types of steppes have developed on chestnut-colored

Both types of steppes[1] have developed on chestnut-colored 133
soil. Within these steppes salt-pans also appear. Further toward the 137
north the soil becomes darker, its humus content becomes greater (3 per- [134]
cent to 5 percent), it changes into the so-called southern black earth,
which has only a slight thickness and has a carbonate layer lying near
it. The plant growth becomes richer, the contiguousness of the vegetation
covering becomes thicker. These are pronounced grazing areas for sheep
and goats. For large livestock they are still not sufficient. For such
livestock only the meadow steppes can be considered; these meadow
steppes often cover large areas along the rivers. To this category be-
long the Selenga steppes and the valleys of the Dzhida and the Uda.
A similar change in the character of the steppes takes place in the
direction of the individual mountain chains, with the various types of
steppes surrounding the mountain ranges in Isohypsen /isohyetal?/ con-
tours.

The principal importance of the Selenga steppes lies in livestock 231
breeding, which is intensified by the breeding of valuable breeds. The
most important regions here are the areas left of the Selenga and the
already mentioned valley of the Dzhida. The old yurts of the Buryat 242
have disappeared, and in their place small, permanent, modest wood
houses have appeared which in long rows surround the kolkhoz buildings
of the concentrated livestock economy. However, in the less favorable
grazing areas, as in the Kundara steppe east of Kyakhta, the old Buryat
life has been retained. For processing the resulting skins, a rather large 282
leather processing plant has been erected here on the middle Chikoy
under the name of Chikoyskiy Zavod. This plant also draws its raw
materials from Mongolia. The cultivation of grain is more in the fore- 241
ground in the other regions on the right side of the Selenga, especially
on the lower courses of the Chikoy and the Khilok.

The broad steppe valley of the Uda is the second most important 231
animal breeding area in the Buryat-Mongol ASSR, especially since here
numerous Russians have been drawn into animal breeding. In the area 361
around the upper course of the Uda, in the region of the Yeravninsk
plain, which is rich in lakes, numerous Russian villages have come into [234]
being in which, in addition to slight agriculture, excellent dairy farming
is pursued. The largest localities in this region are Gunda and Sosnovo-
Ozerskoye.

East of the Selenga, rising from its delta, is the mountain ridge 133
of the Ulan-Burgassy, which forms the watershed between the Uda and
the Turka, which empties into Lake Baykal. This mountain range is
broader than the Khamar-Daban and has a marked plateau-like surface

[1] [i.e. artemisian and meadow steppes -- Analyst]

133 which is covered with boulders and overgrown with bushes. From this plateau only a few rocky peaks extend above 1,600 meters. The bulk of it is covered with thick taiga. Adjoining it /219/ on the northeast is the Ikatskiy Mountain Range, which flows into the Vitim Plateau.

To the west of the Ikatskiy Mountain Range and separated from it by the broad depression of the Barguzin Valley, the Barguzin Mountain Range rises, which accompanies Lake Baykal to the northern end of the lake. The Barguzin differs sharply from the other mountain ranges in Transbaykal in its Alpine forms and its snow-covered peak, with individual mountains rising more than 2,300 meters above the Barguzin Valley and reaching an absolute height of up to 2,701 meters. In many parts of the mountain range, especially in the north, there are traces of an old glaciation: trough valleys, numerous lakes with a fjord-like appearance, etc. From these lakes project mighty drift blocks. Toward Lake Baykal the mountain range slopes down slowly, but toward the Barguzin valley it declines very sharply and steeply. Toward the Barguzin valley the mountain range character is also best stamped on the range. Here steep rock walls rise almost perpendicularly, projecting beyond the tree line, while typical taiga with very thick underwood covers the lower slopes. All this makes the Barguzin Mountain Range very difficult to gain access to. Some of the passes which exist can only be used by skilled hikers. It is therefore no wonder that in the Barguzin Mountain Range untouched nature has best been preserved, and even today this mountain range is still rich in valuable fur-bearing animals. Even the harshly persecuted sable has found a refuge here. The southern part of the mountain range, bordering on the village of Sosnovka on Lake Baykal, has been declared a national preserve.

The picturesque Barguzin Valley stretches for around 300 kilometers between the Barguzin Mountain Range and the Ikatskiy Mountain Range. In places the valley is up to 30 kilometers wide. In terms of its landscape it is divided into three parts. Thick taiga and numerous clearings, extending over the alluvial plains and covered with high grasses, are characteristic of the upper part of the valley, which extends as far as the mouth of the Garga. The central part, extending to the locality of Barguzin, consists primarily of sand with irregular surfaces traversed by dunes. Embedded in these sands are numerous swamps and lakes, and the rivers form a network of arms. Vegetation here is extremely poor and has a steppe character. The rocks projecting from the sand plains show traces of desert-like disintegration, indeed even aeolian sand erosion and other forms caused by wind such as otherwise are

peculiar only to dry climates. At the foot of the Ikatskiy Mountain 133
Range numerous warm springs bubble up; these springs contain above [312]
all sulphates. In addition there are mineral lakes, which, like the [135]
Alginsk lakes, lies in a basin of sulphate of soda of significant thickness.
Below the locality of Barguzin the mountains come right down to the
river and shut off the extended valley basin. Here begins the third
part of the Barguzin Valley, the breach valley of the Barguzin toward
Lake Baykal. On the right side the mountains press forward right to
the river and present picturesque, alluring landscapes. On the left
side, on the other hand, the mountains withdraw more or less /220/,
making free a flat area along the shore. This landscape on the lower
course of the river accompanies the river for almost 40 kilometers.
Thus the Barguzin Valley presents an extremely remarkable landscape.
Epsom salt lakes between alluvial swamps and lakes in the valley basins
of rivers rich in water; wide development of sands with dunes and steppe
vegetation; traces of desert-like disintegration; permafrost; warm springs;
thick taiga on the circumference; snow-covered mountains in the
background: all this shows a heaping up of contrasts such as is un-
doubtedly rarely found on the earth. The area around the upper course [135]
of the Barguzin has alluvial sands rich in gold. For the rest this area
is traversed only by Tungus reindeer breeders. The other part of the [361]
valley basin is an island of settlements in the middle of uninhabited
mountain forests. Numerous Russians and Buryat here devote themselves
to the breeding of livestock and to very considerable agriculture with
irrigation. The rivers coming from the side valleys of the mountain
range are used especially for the irrigation of the fields. The center
of the main area of settlement is the village-city of Barguzin, which
always has several thousand inhabitants. This city lies on the river of
the same name. The Barguzin River is also navigable from here down
and, via Lake Baykal, it represents the sole connection with the out-
side world.

Just north of the mouth of the Barguzin the Svatoy Noz Peninsula adjoins the land. This peninsula forms an island which is 55 kilometers long and is transversed by two mountain ranges which are up to 1, 587 meters high. Only later is this island joined to the shore by a flat narrow piece of land. The material for this is supplied by the Barguzin, the heaping up and the alluvium provide for the current and the waves of Lake Baykal. The original view that the peninsula is a continuation of Ol'khon Island has shown itself to be incorrect, as Busch has shown. On the contrary Ol'khon Island is an underwater ridge running to the

133 northwest of the peninsula and separated from the peninsula by a channel. The Ushkani Islands northwest of Svatoy Noz, on the other hand, rise on this ridge and consist of the same stone as Ol'khon Island.

South of the Uda valley depression there next follows in parallel strips, running in the direction of Lake Baykal, the ridges of the Tsagan-Daban and the Khudunskiy Mountain Range, then--beginning in the west on the Khilok--the Saganskiy Mountain Range and the Tsagan-Khurtey, which is bordered on the south by the broad valley of the Khilok. The railroad follows the upper part of the Khilok. Between Khilok and Chikoy there then rises the Malkhanskiy Mountain Range which on the east flows into the Yablonovyy Ridge. All the valley depressions, such as that of the Uda, the Khilok, and the Chikoy, which on the west over a great width melts into the Selenga steppes, put on a different face the farther one goes to the east. The differences in height between the bottom of the valleys and the ridges become smaller, the slopes become flatter, the mountain forms become round, often with almost flat watersheds. The bottoms of the valleys lie at 850 to 950 meters above sea level, the passes have a height of 1,000 to 1,150 meters, and the peaks are 1,200 to 1,400 meters high. Toward the east the climate becomes markedly more contrary and damper, and accordingly the bottoms of the valleys /221/ show signs of increasing swampiness.
361 Correspondingly the population, which is limited almost exclusively to the valleys, also decreases toward the east. Because of the railroad line the valley of the Khilok is the best inhabited. In this connection Petrovsk-Zabaykal'skiy should be mentioned. It lies on the railroad line coming from Ulan-Ude on a section between the Saganskiy Moun-
[3z] tain Range and the Tsagan-Khurtey and has the largest single foundry in Transbaykal. The iron ore is delivered by the mines of Balyagansk northwest of Petrovsk, and the coal comes from Tarbagatay and Khalyarta in the valley of the Khilok. All three localities lie not far from Petrovsk and are connected to the main line by railroads. The valley area of the upper Khilok and that of the Chikoy are distinguished from the other regions in Transbaykal by the fact that in these valleys summer rye is well cultivated as grain for bread, while otherwise the cultivation of wheat predominates.

Apart from the above-mentioned coal mining localities, the city-like settlements of Khokhotuy and Bada, known for their processing of lumber, and also Khilok and Mogzon lie on the railroad line east of Petrovsk-Zabaykal'skiy and still in the valley of the Khilok, which flows into the Selenga. Khilok and Mogzon have, in addition to food industry, metal and machine factories. East of Mogzon the railroad crosses the Yablonovyy Ridge and enters Nerchinsk Daur.

Nerchinsk Daur

The Yablonovyy Ridge, which is among the best known mountain /33 ranges in Transbaykal, forms the boundary between the two Daurs. The Yablonovyy Ridge forms the watershed between the rivers flowing into the Amur and those flowing into the Selenga, and thus in the broadest sense it separates the sphere of rivers flowing into the Pacific from the sphere of rivers flowing into the Arctic Ocean. However, this applies only to its southwestern part, for above the Chita River the Yablonovyy shoves in between the Vitim and its tributary the Karenga, and further to the northeast it divides the river area of the Vitim from that of the Olekma, all of which flow toward the north to the Lena. In addition, [37] the Yablonovyy Ridge forms a remarkable climatic and plant-geographic border. The influences of the east Asiatic monsoon penetrate as far as this mountain range and permit deciduous trees to flourish here as representatives of a more moderate climate. West of the ridge deciduous trees are lacking. In this connection the height of the ridge is not so significant as to permit such an influence to be expected.

The Yablonovyy Ridge generally attains a height of only 1,200 to 1,300 meters. Its highest point, which is 1,670 meters high, is the Sarakan, which lies northeast of Chita and which as a golets projects alone from the otherwise very monotonous surface. The relative differences in heights between the valley depressions and the ridges are, however, only insignificant. The railroad crosses the mountain range west of Chita at the Yablonovaya station at /222/ a height of 1,050 to 1,070 meters. The pass here lies only 105 to 125 meters above the valley of the Khilok on the northwest but it is 305 to 325 meters above the bottom of the valley of the Ingoda with the decline to the Ingoda valley also being shorter and steeper. This asymmetrical structure with a steeper southeastern slope and a flat northwestern slope is a characteristic of almost all the mountain ranges in Transbaykal. Obruchev explains this contrast by the effects of the frozen earth by means of solifluction and heavier erosion. The ridges themselves also appear little in the picture of the landscape. From the valley of the Khilok the slope rises slowly to the watershed, which appears to be an almost level rampart. The ridge itself is a more or less plain which is covered with thick forests. Sunk in this plain are saddle-like hollows taken up by swamps. From

133 these hollows, as a rule, the rivers find their origin.

Southeast of the Yablonovyy Ridge and its western continuation,
the already-mentioned Malkhanskiy Mountain Range, there extends
the rather wide valley of the Chikoy and of the Ingoda, which is for
361 the most part settled by Russians. Here the Russian villages lie along
the rivers like pearls on a string, while only a few kilometers away
there stretch mountain forests which are still uninhabited. The best
connections to these areas of settlement are from the railroad stations
of Khilok and Mogzon.

The capital of the region, Chita, lies at the point where the
Chita River flows into the Ingoda. After the construction of the railroad
line, Chita quickly developed from a small town into a large
city, which by 1939 already had 102, 555 inhabitants, and at present
its population probably already exceeds 150, 000. The city is built
on both sides of the river of the same name, and, lying 660 meters
above sea level, the city rises like an amphitheater on two terraces
of the land rising toward the north. It lies in a dry, healthy region.
Chita constitutes the economic center of the entire region. It is especially
known for its fur and leather processing. In addition, there
are concentrated in the city important flour mills, saw mills, and
[316] rather large repair shops for locomotives and railroad cars. A few
kilometers west of the city lies the Chernovskiye Kopi, one of the
[317] most important coal districts in the area. Natural calcinated soda is
extracted from the Doroninskoye Lake, which lies further up in the
valley of the Ingoda.

133 From Chita the Ingoda breaks through on the southeast first
the Cherskiy Mountain Range and then the Daur Mountain Range,
and, then again bending in the direction of Lake Baykal, it finally
follows the depression between the Daur Mountain Range and the
Borshchovochnyy Mountain Range. In this depression the Ingoda unites
with the Onon, which comes from the south. These two rivers then
form the Shilka, the left source river of the Amur.

Approximately 60 kilometers below the point where the rivers flow together, and at the Nercha which flows into the Shilka from the north, is the city of Nerchinsk (28, 000 inhabitants), and 85 kilometers further down lies Sretensk. Here the well-known Nerchinsk steppe island stretches on the left side of the Shilka, principally between the Shilka's two tributaries, the Nercha and Kuenga. /223/ /Sketch Map of Chita Oblast:/ The bulk of this steppe island consists of an almost ideal plain. The rest of the steppe island is gently

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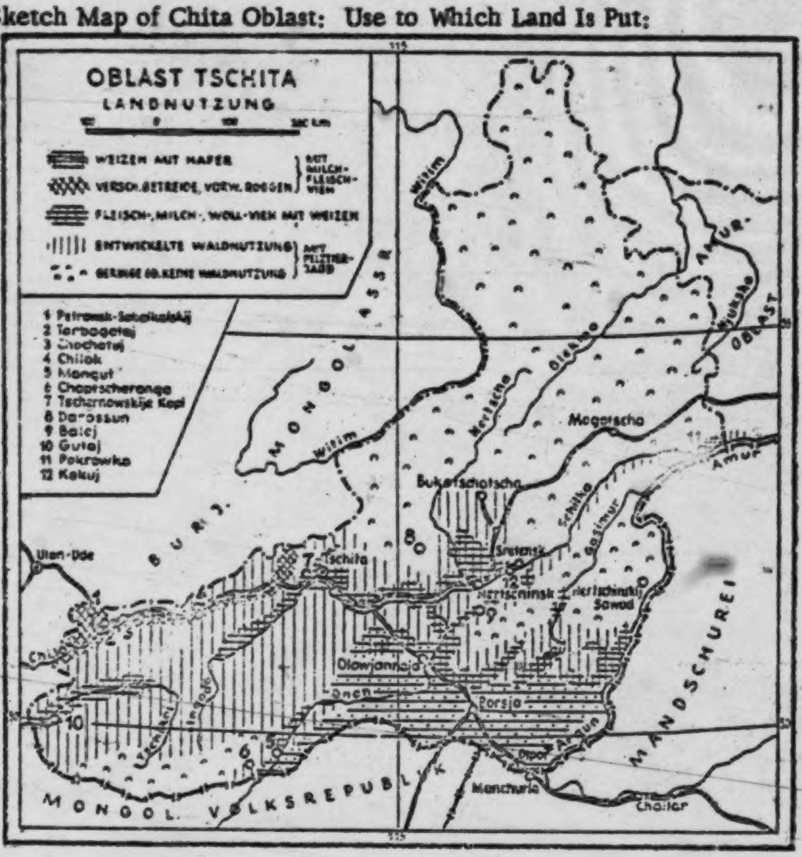
Sketch Map of Chita Oblast: Use to Which Land Is Put:


OBLAST TSCHITA
LANDNUTZUNG
50 0 100 200 km
WEIZEN MIT HAFER
VERSCH. GETREIDE, VORW. ROGGEN
MIT MILCH-FLEISCH-VIEH
FLEISCH-, MILCH-, WOLL-VIEH MIT WEIZEN
ENTWICKELTE WALDNUTZUNG
GERINGE OD. KEINE WALDNUTZUNG
MIT PELZTIERJAGD
1 Petrowsk-Sabaikalskij
2 Tarbagatej
3 Chochotej
4 Chilok
5 Mangut
6 Chaptscheranga
7 Tschernowskije Kopi
8 Darassun
9 Balej
10 Gutaj
11 Pokrowka
12 Kokuj
Witim
Amur
Oljokma
Nertscha
Mogotscha
Bukatschatscha
Schilka
Gasimur
Tschita
Sretensk
Nertschinsk
Nertschinskij Sawod
Olowjannaja
Onon
Borsja
Argun
Otpor
Manchuria
Chailar
Ulan-Ude
Chilok
Ingoda
MONGOL. ASSR
BURJ.
MONGOL. VOLKSREPUBLIK
MANDSCHUREI
AMUR OBLAST

▦ wheat with oats } with dairy and meat livestock

▧ various grains, predominantly rye } with dairy and meat livestock

▤ meat, dairy, and wool livestock with wheat

⫽ developed exploitation of the forests } with hunting of fur-bearing animals

⌒ ⌒ ⌒ slight or no exploitation of the forests } with hunting of fur-bearing animals

1. Petrovsk-Zabaykal'skiy
2. Tarbagatay
3. Khokhotuy
4. Khilok
5. Mangut
6. Khapcheranga
7. Chernovskiye Kopi
8. Darasun
9. Baley
10. Gutay
11. Pokrovka
12. Kokuy

rolling with gentle rises toward the edges. In the ground lies a granite /33 foundation, over which is liparite and tuff, covered over by a thick layer of lacustrine deoposits, which point to the formation of the steppe basin from a former lake (Gladtsin, 69). Striking is the present day dryness, which forms a sharp contrast to the forest landscapes surrounding the steppe island. The low position (620 to 680 meters above sea level) as a depression between the contiguous mountain chains, may well be the reason for the special climatic conditions prevailing here. The fertile steppe soil, in many cases designated as black earth, has lead to thick settlement, and, accordingly, the grass steppe only rarely now shows itself in its original dress. The levelness of the steppe is interrupted only by flat, mostly dry valleys with gentle slopes. /224/ In the deeper places there appear damp meadows, often swamps, and also not uncommonly even salt-pans. The slopes of the valleys sloping [137] to the north are overgrown with birches, poplars, meadows, and bushes, especially if the valleys have the character of a ravine. The transition to the forest landscapes occurs quickly. However, the souther slopes remain free of forests the longest and often appear in contiguous taiga as small forest steppe islands. Toward the Shilka the steppe plain breaks off with a steep, heavily valleyed, high step, which from the river often gives the impression of a mountain land. Next to the dairy and meat economy, the cultivation of grain stands in first place in the agriculture of the steppe island. The economic center is Nerchinsk [361] with its mill plants, brandy and alcohol distilleries. In terms of transportation Sretensk has a better location, for there the regular Amur shipping begins. West of Sretensk in Kokuy there is a shipyard.

The Transbaykal Railroad runs from Nerchinsk on further on the 496 left shore of the Shilka as far as Kuenga, and from here a branch railroad leads to Sretensk. The main railroad line, which from here on bears the name of Amur Railroad,[1] leaves the Shilka Valley at Kuenga and circumscribes the Shilkinsk Mountain Range in a great arc. Here 316 in the north, lying in a side valley of the Kuenga and connected by a railroad line, are the coal mines of Bukachacha, which in their production stand in first place in Transbaykal, and farther to the east around the Mogocha Station lie extensive gold fields.

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69. Gladtsin, I.N., Geomorfologicheskii ocherk Zabaykaliya /Geomorphological Sketch of Transbaykal/, Trudy of the Geographical Institute of the Academy of Science, (Moscow, 1938), p. 174.

000 around the Mogocha station lie extensive gold fields. Thick taiga /37 lightly inhabited here* crosses over all types of land. The raw climate is already strongly perceptible. Permafrost sets in already at a depth of 1 meter. The increasing swampiness of the lower places, and the increasing appearance of gol'tsy which are bare or covered only by bent wood vegation /Krummholzvegetation/, show that here we already find ourselves in the transitional area to the raw forest landscapes of the north.

/38 The Baykal Cherskiy Mountain Range accompanies the Yablonovyy Ridge on its southern side and goes in the same direction as the Yablonovyy. East of the Ingoda break-through, the broad, swampy valley of the Chita River forms the border. Then the Cherskiy Mountain Range extends further still to the northeast into the still little known regions around the source of the Nercha. It is to this area, in the opinion of Vosnessenskii, that the 1,971 meter and 2,091 meter high Kropotkin Mountains belong. The course of the Daur Mountain Range, which adjoins the Cherskiy Mountain Range and runs in a parallel line to it, is still not fully clarified. Since the border between the two mountain chains is very vague, the two ranges are often referred to by Russian authors as one range, either under the first or the second name: In the break-through valley of the Ingoda the two mountain ranges can be recognized as separate units. Two tributaries of the Ingoda, the Olenguy on the right and the Kruchina on the left, divide the overall massif. Further toward the east the Daur Mountain Range remains on the left side of the Ingoda and Shilka, crosses /225/ the Nercha and, in the opinion of Gladtsin, could continue into the Shilkinskiy Mountain Range. In their gently rolling surface forms the two mountain ranges show their original form to be almost level. With the later elevation this original plain has been far more valleyed and divided up through increased erosion that the Yablonovyy Ridge has been; and, accordingly, watershed areas in some parts have disintegrated or show a course that is often very winding.

The Borshchovochnyy Mountain Range, the next mountain ridge to the southeast, is to be regarded as the last typical Baykal mountain chain. The Borshchovochnyy begins in the area around the upper course of the Ingoda and of the Onon on the Mongolian border and stretches almost 1,000 kilometers to the east-northeast. With this mountain range, too, the eastern part of its course is more marked and better known that the western part. Immediately after the break through in the Daur Mountain Range, the Borshchovochnyy forces the

*[i.e. Shilkinsk Mountain region --Analyst]

Ingoda to turn to the east and then follows the river in the same direction. In a chasm the Onon here breaks through the mountain range from the south, but the ridge remains on the right side of the Shilka and, bordered on the south by the Gazimur, reaches the Argun where it runs into spurs of the Great Khingan. Thus two tectonic lines meet here at a sharp angle. The surface forms generally have the same character as on the above-mentioned mountain chains. The breaking up into valleys is especially prominent in the eastern part, along the Shilka and toward it, since here, following the usual picture in the Baykal area, the southern slope toward the Gazimur is short and precipitous, and, accordingly almost all the rivers are directed toward the Shilka. In the vegetation picture, too, the Borshchovochnyy Mountain Range still shows the full, thick forest covering; only south of Chita does the steppe penetrate even to the ridge of the mountain.

Toward the southwest, in the area between the long valley of the Ingoda and the Chikoy on the one side and the Onon on the other side, all three mountain chains--the Cherskiy, Daur, and Borshchovochnyy mountain ranges apparently flow together, according to knowledge to date. No sharp borders can be drawn here. The Borshchovochnyy Mountain Range, however, has the principal role here, for it carries the main watershed between the waters flowing off to the south to the Onon and the rivers heading toward the north to the Chikoy and the Ingoda. The Cherskiy and Daur Mountain Ranges, on the other hand, are broken through and divided into individual parts, not only by the upper courses of the Chikoy and the Ingoda but also by their numerous tributaries. The entire area covering the region around the upper course of the Ingoda, the Chikoy, and the Onon, has, in contrast to the rest of Transbaykal, a peculiar physical-geographical character. This area is a mountain land with numerous heights, which extend far beyond 2,000 meters. The best known mountain is the Sokhondo, which is 2,508 meters high. It lies on the main watershed in a mountain chain, whose highest elevations all reach between 2,243 meters and 2,332 meters. However, as Gladtsin (69) /226/ reports, north of

69. Gladtsin, I.N., Geomorfologicheskii ocherk Zabaykaliya /Geomorphological Sketch of Transbaykal/, Trudy of the Geographical Institute of the Academy of Science (Moscow, 1938), p. 169.

this series of heights mountains have been found which are not inferior

133 in height. Thus the Barun-Shebetuy golets, which lies between the Chikoy and its tributary the Chikokon and which is 2,556 meters high, is taller than the Sokhondo, which formerly was considered to be the highest mountain in Transbaykal. Because of their location away from everything and because of the difficult access to these uninhabited regions, they are still very little known. However, the research of Dengin gives a general picture of the landscape, which does not differ from the rest of Transbaykal in its geological-morphological history. The Barun-Shebetuy and also the gol'tsy neighboring it, like most of the mountains in the Sokhondo series, also have a flat surface, and the rest represents a strongly elevated area which is almost a plain. The present-day relief is the result of a very heavy erosion with an important role having been played by the glaciation in the Quarternary period, which is indicated on the Sokhondo by Kare /Karst?/, trough valleys, and moraines and which apparently also gripped the other mountains, which are no less high. Therefore, the same thing has resulted here as is shown by the morphological relationships in the western part of the Khamar-Daban and in the bulk of the Barguzin Mountain Range: everywhere that the diluvial glaciation has gripped a place, the elevated peneplain parts have experienced a much stronger shaping into mountain-like forms, indeed a shaping almost into the Alpine type, than the other areas. Of special morphological significance for the area around the upper course of the Ingoda, the Chikoy, and the Onon, is, in addition, the mighty appearance of intrusive rocks from the Paleozoic to the upper Mesozoic periods and also the appearance of effusive rock such as porphyry, dazite /Daziten/, andesite, and basalt of varying age. These rocks, because of their varying resistance, have contributed significantly to the differentiated shaping of the relief. From all this it is clear that the present-day relief does not correspond with the geological-structural formation and its direction by reason of the prevailing erosion processes of the past and present. The slopes of the [137] mountains are as a rule covered with thick forests. Only on the sides facing south are there treeless steppes, especially, naturally, on the extreme slope facing Mongolia. Pure steppe, for example, crosses the foot of the Sokhondo to a height of 1,200 meters. Birches and aspens, soon joined by pines, constitute the transition to the raw mountain taiga, in which larches and Siberian stone birch predominate. From 1,900 meters on, the transition to mountain tundra begins via bent wood vegetation. As a consequence of mighty storms, the windfallen wood is very heavy. There are Russian settlers only on the outer

There are Russian settlers only on the outer edge of the region[1] in the valley plains of the main rivers; the entire, vast interior, on the other hand, is completely uninhabited. 133 [361]

The Manchurian Railroad branches off from the Karymskoye station between Chita and Nerchinsk. This railroad strikes the direct route to Vladivostok via Harbin. The last Soviet Russian station is Otpor, which /227/ lies opposite the Manchurian border. The railroad runs directly to the southeast and, in the process, crosses over all the mountain ridges almost at a right angle. After the Borshchovochnyy Mountain Range, there follows the Gazimur-Onon ridge, which reaches south of the Gazimur River to the Argun, and then the Erman, Nerchinskiy, Klichinskiy, and finally the Argun mountain ranges. All these mountain ridges run in the direction of Lake Baykal and run almost parallel to one another. The Gazimur-Onon ridge extends along the middle course of the Onon on the north side of the river until the break through of the river. The Gazimuro-Onon ends on the Argun between the Gazimur on the north and the Uryumkan on the south. It is never over 1,000 meters high. The Erman Mountain Range is already divided into two parts by the Tarey Basin which has no outlets. In the picture of the landscape of the entire region a gradual change is apparent from northwest to southeast, and also one from northeast to southwest. [496]

From northwest to southeast, i.e., in the direction of the Manchurian Railroad, the ridges gradually become lower, the differences in height decrease. The coniferous forests and likewise the swamps disappear. A striking wealth of birches enters, covering first the ridges, then only the northern slopes, and finally making way for the pure steppe. In the process salt-pans can already appear in the depths.

To the northeast, toward the Argun, all the mountain chains become higher, the Erman Mountain range reaching up to 1,400 meters, the Nerchinskiy Mountain Range reaching up to 1,300 meters, and the Argun Mountain Range reaching 900 to 1,000 meters. In the regions whose waters empty into the Argun, especially in drainage areas of the Gazimur, Uryukan, and Urov, the land has the character of a medium mountain range with peaked heights, deeply etched river valleys, and larger relative differences in height (300 to 500 meters). The undeveloped water network with great drops and numerous stony current rapids and waterfalls points to a recent elevation of this region, whose landscape can be designated as the Argun type. Toward the southwest the absolute height of the ridges decreases, the relative differences become smaller (100 to 150 meters on the mean), the valleys become wide, the rivers form great arcs and numerous meanderings.

[1] [i.e., in the area between the valley of the Ingoda, Chikoy and the Onon -- Analyst]

/133 Side erosion predominates. Gradually the ridges dissolve into hills. This landscape, designated by Presnyakov as the Gobi type, takes up the entire southern part of the Argun region. Here are the mountain steppes of the Onon and Argun. The Tarey Basin, which is also designated as Onon plain by Russian geographers, should be named as the third province. The Tarey forms a basin with no outlets and extends beyond the Mongolian border as far as the Kerulen. In the center lie the Tarey lakes, of which various ones cover a significant area. Thus the Barun Tarey covers 435 square kilometers, and the Sun Tarey covers 300 square kilometers. The countryside is for the most part level and is interrupted only by former river valleys and lake basins which are now dry. The /228/ remaining lakes lie 60 to 70 meters below the general surface, i.e. at an absolute height of 620 meters, but they are always still up to 5 meters deep. Despite the clear signs of recent drying up, water springs appear in many places on the surface. These springs form the centers of human life. The steppe character often gives way already here to wasteland forms.

The border between steppe and forest extends from Aksha on the middle Onon via Il'inskaya to the north to the watershed between Aga and Ingoda, then on the Ingoda to the east to the mouth of the Aga. From here the border circumscribes the Argun mountain country in an arc swinging to the south via the localities of Onon-Borzya, Akatuy, and Algachi. The border then turns again toward the northeast via Nerchinskiy-Zavod to the Argun.

Southeast of Chita there begins the Aginsk steppe, a true grass steppe, which takes up the river area of the Aga and the middle Onon. [231] Here lies the national oblast of the Buryat, who have made the area into an important livestock-breeding region. The Argun steppe takes up the entire southeast, where livestock breeding likewise dominates the economy. But here there are Russians, who pursue the breeding of cattle and sheep in large, specialized, state farms. In addition, [241] there are also some state farms for horse breeding. To the north of both steppes agriculture, with wheat as the main product, is diffused over a large area, and in a broad front it penetrates to the south. [361] Along the great rivers and also along the Argun the villages extend in a line through the middle of the steppe. The diffusion of agriculture [134] is favored by the circumstance that, despite the often very poor steppe vegetation, a horizon very rich in humus, a type of black earth, has developed under the pitted grass /Grasnarbe/.

000 The wealth of natural resources is, however, of far greater

The wealth of natural resources is, however, of far greater significance for the economic development of the future.* In this connection the non-ferrous metals in addition to iron ore should be mentioned primarily. The still insufficient connection with the transportation network, however, offers the greatest handicap to the exploitation of the natural resources. Apart from the railroad line which runs from Karymskoye to Otpor to Manchuria, there are only land routes available. Even the very important zinc-lead mines in Khapcheranga, in Mangut, and on the Sokhondo can be reached from the Ulstuy station, west of Karymskoye, only by a built-up land route which is around 320 kilometers long. And by the same route, too, the produce of the mines must be brought to the railroad line on trucks. Because of the smaller differences in height the land route along the Onon valley to the Olovyannaya station has recently been used in perference to the above-mentioned route, which crosses more mountain ridges. Also the regions in the angle between the Manchurian side branch of the railroad and the Argun can only be reached by built-up land routes and truck transportation. Borzya on the railroad line appears to be developing here into the traffic center. Toward the east a narrow-gauge railroad leads to the /229/ non-ferrous metal mines of the Argun district, and toward the southwest a similar line leads to Choybalsan in the Mongolian People's Republic. The city itself, located in the middle of the Argun steppe which is rich in livestock, has a large meat plant. In addition to Borzya there should also be mentioned on the Manchurian branch of the railroad the city of Olovyannaya, which has already been mentioned several times and which is known for its tin works. The bulk of the other localities have already been listed in the discussion of the natural resources.

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*[i.e. of the Aginsk steppe -- Analyst]

The Vitim Plateau and the Northern Forested Mountain Provinces

To the north of the Yablonovyy Ridge, spreading east of the Ikatskiy Mountain Range, is the Vitim Plateau, which is adjoined on the north by a series of mountain ridges. The entire region represents a forest mountain range landscape, which climatically is very raw and which makes it very difficult for man to make his way here. Agriculture disappears almost entirely here or is limited to small islands which are scattered sporadically. Only Tungus hunters and reindeer breeders in small numbers traverse the thick taiga and pass a laborious life . However, these wastelands conceal extraordinarily rich gold streams, which are diffused especially in the central part of the Vitim Plateau and which have brought into being active gold

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316 mining. Accordingly, these parts have been best explored and are best known.

/299/ /Sketch Map of the Vitim Plateau and the Northern Mountain Forest Provinces/[1]

133 /230/ Here in the northeastern continuation of Transbaykal, the characteristic morphological traits are also clearly marked. There are old root plains, which are dissolved into horsts and grabens by breaks, with contiguous mountain ridges and wide valley plains appearing in addition to wide, gently rolling, high plains which have only mountain cores projecting above them. The old disturbance lines running toward the northeast in the Lake Baykal direction also traverse this area and determine the essential border lines of the morphological units. Accompanying the metamorphic and mass rocks of the Archeozoic era, there are already here more recent sediments, and above all very frequently there are large basalt coverings, which are of decisive importance for the surface structure of various regions. The Ice Age has been influential in the morphological shaping in places, and has heaped up large moraines in the valleys. Generally the phenomena of frost and solifluction appear far more often than in the rest of Transbaykal.

The Vitim Plateau is formed from the growing together of the Transbaykal mountain ridges stretching there from the southwest. The bulk of the plateau is bordered by the Vitim itself. This river flows first toward the south, then turns sharply toward the northeast and then toward the north-northwest. The interior of the high plain is drained by tributaries of the Vitim, principally by the Tsipa and its tributary, the Amalat.

The plateau represents a monotonous high plain, traversed by flat-sloping embankments; between these embankments there are swampy plains covered by thick larch taiga. These plains often extend over ten kilometers and more without the slightest change. The little tiny rivers flow in flat, open valleys; larger rivers, on the other hand, have sunk 40 to 50 meters into the high plain with one side, washed away underneath, often appearing to be steep and rocky, while the other side extends as a damp, swampy plain, filled with small lakes. At present, side erosion predominates in all the valleys. The watersheds rise 400 to 600 meters above the bottoms of the valleys, but the watersheds lie at a very great distance from them. The absolute height of the main watershed reaches 1,700 to 1,870 meters with the passes having a height of 1,385 to 1,490 meters ([illegible])

[1] [Cf. cat. 116, p. 261 -- Analyst]

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Sketch Map of the Vitim Plateau and the Northern Mountain Forest Provinces

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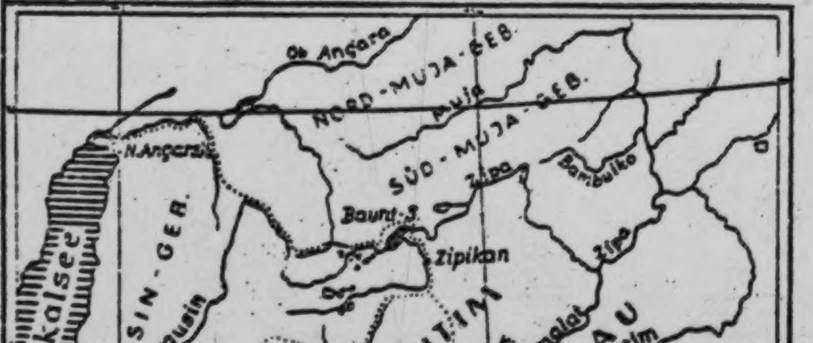
Ob. Angara
NORD-MUJA-GEB.
Muja
SÜD-MUJA-GEB.
N.Angarsk
Zipa
Bambuiko
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Zipikan
Zipa
Baikalsee
BARGUSIN-GEB.
Bargusin
Sosnowka
WITIM
PLATEAU
Kl. Amalat
Gr. Amalat
Witim
Witim
JABLONOWYJ-RÜCKEN
Bargusin
Romanowskoje
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50
100 km

(Gladtsin, 69). Between the Tsipa and the Amalat, i.e., in the main division line, the watershed, however, projects only 360 to 450 meters over the general height of the surface; but with the flat slopes even their highest places differ only slightly from the surroundings. "Somewhat fewer grasses, in their place more moss, less green and fewer branches of larches, the appearance of low-growing birches in larger numbers than in the plains; all these are things by by which one can recognize the higher position of the watershed," says Kropotkin. The river area of the Tsipa is especially uniform in this connection. This results from the slight fluctuations in height along with great expanses in the horizontal lines; in addition, the thick forest covering conceals the irregularities in the surface and rounds off and equalizes the sharper contours. The broad valley areas, covered with swamp meadows, /231/ give way so gradually to rolling land that it is difficult to draw a border since the slopes mostly have an inclination of only 2° to 5°. However, here and there individual mountains with marked contours appear above the general surface. The majority of these mountains consist of granite. Above 1,500 meters these mountains are bare of any form of plant growth and appear as naked rocks studded with mighty blocks and boulders. They are the usual gol'tsy. As a rule they have the form of peaks or embankments; less commonly they have sharper features with the rock being decisive for the form.

Toward the peripheral regions the plateau is more broken up and in places acquires a mountainous character. This applies especially to the area around the upper course of the Barguzin and the Vitim. The southwest, on the other hand, again shows more the level, gently rolling surface. This is explained by the great basalt cover here, which lies over everything. Where this covering does not exist, the relief is sharper and shows more contradictory traits. The diffusion of the basalt is suited to the river valleys with which genetic connections must undoubtedly exist. The border of the diffusion of the basalt runs along the Vitim in the west and south, and in the north it runs along the Great Amalat as far as the meeting of this river with the Lesser Amalat; from here the border then withdraws toward the south to the

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69. Gladtsin, I.N., Geomorfologicheskii ocherk Zabaikalia /Geomorphological Sketch of Transbaykal/, Trudy of the Geographical Institute of the Academy of Science (Moscow, 1938), p.151.

Vitim. The basalt covering thus fills almost the entire southwestern corner within the course of the Vitim. Here, too, three typically-formed volcanic cones have been discovered: the Mushketov Volcano; opposite it, on the right side of the Vitim in the vicinity of the mouth of the Kokyrtuya, the Obruchev Volcano; and somewhat above this, again on the left side of the valley of the Vitim, the Lopatin Volcano. The tree cones project approximately 100 to 160 meters above the surrounding area. Even if these volcanos may also have played a role in the formation of the basalt covering, still the greater part of the covering goes back undoubtedly to effusions in cleavages /Spaltenergüsse/. If the basalt covering has also contributed to the level character of the surface and to its maintenance, the rivers have cut deeply into the plateau in those places where they have succeeded in penetrating to the 20 meter thick basalt; accordingly, gorge-like, even canyon-like valleys are especially characteristic for these peripheral regions. These valleys with their rocky walls stand in sharp contrast to the level surface.

The main water veins of the Vitim Plateau follow in their course the tectonic lines. The Tsipa forms not far from the source of the Barguzin. It flows first toward the northeast in a broad valley filled with lakes; then, however, it very suddenly breaks out of this valley, turning to the south, and relinquishes to the Bambuyka the further use of the tectonic valley extending to the northeast. The Bambuyka after a certain stretch likewise breaks out toward the south and leaves the last stretch of the valley free for the Tuldunin, which reaches to the Vitim. The cross-bar which separates the Tsipa and the area around the source of the Bambuyka, consists only of a low hilly country of river boulder alluvium with lakes dug into the depressions. It is from these lakes that the /232/ Bambuyka also finds its origin. Old stone is also supposed to be underneath this boulder barrier. The second barrier between the Bambuyka and the Tuldunin is determined by a granite bar. After its break-out, the Tsipa flows in a gorge-like valley, which in places is narrow but which then later broadens into a wide depression. In this valley the Tsipa runs toward the southeast almost exactly parallel to the Vitim, only in the opposite direction, until it runs into the Amalat forming from the right. As the Great Amalat, this river comes from the southwest and in a broad valley extends toward the northeast approximately parallel to the southeastern border of the plateau and the Vitim which flows there. Although the Tsipa has more water, in the course of this valley it becomes part of and continues the direction of its tributary toward the northeast until it empties into the Vitim. In the Tsipa-Bambuyka valley and in the Amalat-Tsipa valley there are tectonic lines running in the Lake Baykal direction. These lines here are crossed by disturbance lines running southeast-northwest. These lines seem to be indicated by the middle course of the Tsipa and the northwest direction of the Vitim. 133

The valley of the upper Tsipa is indicated as the tectonic continuation of the Barguzin valley. It attains an extraordinary width (up to 25 kilometers and more) and represents the floor of a former important fresh water lake, whose surface, clearly indicated by terraces, lay at 1,129 meters above sea level. The present-day valley basin is taken up principally by peat moors and meadows with clusters of grass, in which a large number of lakes of all sizes have remained as remnants of the former water basin. The largest lakes are Baunt, Busani, and Okunevskiy lakes. Baunt Lake, through which the Tsipa flows, lies at a height of 992 meters. The southern part of this depression, which is rich in lakes, is used by a tributary of the Tsipa, the Tsipikan, whose source neighbors on that of the Vitim. In this area, on the upper Tsipikan and Vitim, lie the richest gold fields in the Vitim Plateau. Toward the east the former lake basin thins out to a narrow valley; and, accordingly, boulder barriers occur easily to stop the Tsipa and force it toward the south. The tectonically determined valley, however, as has already been stated, continues in the same direction toward the northeast and serves as a river bed for part of the Bambuyka and for all of the Tuldunin.

The most important gold regions of the Vitim Plateau are in the upper courses of the Tsipikan, Vitim, and Lesser Amalat; in short, they are deposited somewhat toward the west, almost in the central part of the plateau. The gold streams in large part lie in the permafrost area, and, accordingly, the dressing of the ore and the extraction of the gold takes place with difficulty, even though dredges and mechanical gold washing installations are employed. The supplying of the area causes special difficulty, since supplies must be brought through vast, uninhabited taiga wilderness. To be sure, Baunt Lake supplies fish, meat comes in part from the reindeer herds of the Tungus, potatoes and vegetables are cultivated to a slight extent on the spot, but the outside world must be / 233/ relied on for the rest of the supplies. For this the Barguzin Valley plays the primary role, because the shortest routes, although difficult ones, lead from it to the gold districts. 316

316 Land road connections also exist toward the south via Romanovskoye
[491] on the Vitim to Chita. A rapid and continuous means of transportation
[509] has recently been ensured by an airline, which is flown regularly and which connects Chita with Tsipikan, the center of the northern gold district.

133 To the north of the Tsipa-Bambuyka valley rises the Muya mountain country, which is divided into two long ridges by the river of the same name which flows toward the northeast to the Vitim. These two long ridges are the Southern Muya Mountain Range and the Northern Muya Mountain Range. The northern border of the latter is formed by the extended valley of the Upper Angara, which flows toward the west-southwest to Lake Baykal.

The Southern Muya Mountain Range, a mighty, massive horst, forms the watershed between the Tsipa and the Muya. It has a raw, wild appearance with a ridge of numerous gol'tsy, with an entire series of heights, crowned with snow, rising over 2,000 meters. The picture of the entire mountain range, however, is not unified, and the wealth of varying forms is determined by the change in the rock. The former root surface is, to be sure, heavily destroyed, but it is still always recognizable. In the higher places traces of an old glaciation are to be found everywhere in the form of circus /circular?/ valleys/Zirkustäler/, trough valleys, round basin lakes /Karseen/ and basin moors /Karmooren/, and, in the valleys, deposits of boulders and rubble. Because the Muya Valley lies at the slight altitude of 450 to 600 meters, the slope toward the north is much sharper than the slope toward the south to the Tsipa Valley, which generally has a height of more than 900 meters. The passes are difficult, small in number, and 1,450 to 1,700 high. From the swamps at the foot of the mountain range rise slopes covered with thick taiga. Here the ascent into the narrow valleys overgrown with shrubs is especially difficult. Only at heights where the vegetation discontinues, is there an opportunity for free movement.

The valley of the Muya is determined tectonically as a depression. It attains a width of up to 30 kilometers. A mixture of deposits of old and recent date makes the valley plain appear rich in variety. Hills, long embankments, sand bars with closed off lakes, in between swamps and moors displace one another. Terrace formations on the border of the valley and widely diffused lake sediments permit the basin of a former lake to be recognized in the valley.

The Northern Muya Mountain Range, likewise a horst, is scarcely to be differentiated from its southern opposite. The valley of the Upper Angara, which opens onto Lake Baykal, has a certain moderation in climate, and accordingly there exist in this valley some agricultural islands occupied by Russians. Otherwise the entire region--apart from hunters and some Reindeer Tungus--is as good as uninhabited. This applies also to the mountain ridges lying farther north, such as that of the Upper Angara, its eastern continuation, /234/ the Delyun-Uramskiy Mountain Range, and the Mama Highland. Only far on the other side of this uninhabited zone, in the southern part of the Patom Plateau on the lower Vitim, are settlements worthy of mention encountered: such as Bodaybo, Leninsk, and Artemovsk, which the wealth of gold there, too, has caused to come into being. But all of these areas already lie outside of Transbaykal and can therefore be mentioned only peripherally. They belong to the sphere of influence of the actual Lena and tend economically toward Irkutsk and Yakutsk.

The Olekma Mountain Country and Olekminsk Stanovik

With this region we encounter vast areas, which are almost uninhabited in most of the northern part and which are still very little explored. Thus even the relationship of the large mountain chains can still not be clearly laid down. Best known still is the most southerly part, which extends as a narrow strip along the Amur and whose waters also empty into the Amur. Thanks to the Amur Railroad, which runs almost parallel to the river at a distance of 50 to 75 kilometers, these sections are also more strongly incorporated in the economy and brought nearer to civilization.

The eastern border of the province is formed by the Olekma, its right tributary the Nyukzha, and the Amur tributary, the Oldoy. The western boundary is clearly marked only in the north by the Vitim; in the south, on the other hand, between the southeastern bend of the Vitim and the Amur, the border is undetermined since the Transbaykal mountain ranges continue here into the Olekma region without interruption.

The Yablonovyy Ridge pushes between the Vitim and the upper course of the Nercha into the area as far as the middle course of the Olekma directed toward the north. The Yablonovyy here stretches on the northern side of the upper course of the Olekma and divides its tributaries from those of the Kalakan and the Kalar, which empty into the Vitim. The Yablonovyy Ridge thus divides the entire province into the Olekma Highland in the north and the Olekminsk Stanovik in the south. Even if the Yablonovyy Ridge, which many geographers consider to end already at the Karenga, a right tributary of the Vitim, continues as far as the Olekma, as Obruchev believes, and ends approximately opposite the mouth of the Nyukzha, it still has no connection, either from a geological or tectonic point of view, with the Stanovoy, which rises on the other side of the Olekma, as is still depicted falsely on many maps. The direction of the Yablonovyy Ridge runs into that of the Stanovoy almost at a right angle, or at least at a sharp angle. The over-all direction of the Stanovoy goes toward the west on the northern end of Lake Baykal and points rather to a connection with the Muya Mountain Ranges, but in no way to a connection with the Yablonovyy Ridge.

The following three mountain ridges in the Olekma Highland are listed from south to north: the Kalar Mountain Range, north of the river of the same name /235/; then the Udokan Mountain Range, and the Kodar Mountain Range. While the two latter mountain ranges are separated from one another by the valley of the Chara (flowing to the Olekma) and the Koyurla (flowing to the Vitim), the Kalar and Udokan mountain ranges melt into a plateau more than 2,000 meters high, in the east approximately in the middle between the Vitim and Olekma. Here, south of the area around the source of the Kalar, two mighty gol'tsy on the plateau rise to a prominent height. These are the Golets Skalisty' (Rocky Golets), which is 2,800 meters high, and the Golets Snezhny' (Snow Golets), which is 2,515 meters high. According to present-day knowledge, these gol'tsy represent the highest elevations in the Olekma Highland. A more recent report states that in the same Udokan Mountain range a still higher mountain by the name of Typur has been found, which even exceeds 3,000 meters. But nothing else is known about this mountain.

The Kalar, Udokan, and Kodar mountain ranges consist basically of pre-Cambrian crystalline slate and gneiss, which are penetrated by thick intrusions of granite. Only in the valley areas which separate the mountain ranges from one another, are more recent formations to be encountered; for example, in the valley of the upper Chara continental Jurassic is encountered. Although the three valley depressions are very wide and deep in parts, all three mountain ranges, nevertheless, have a symmetrical connection. The Kodar Mountain Range in the north has a flat northern decline and rises toward the south, where it breaks off steeply at the Chara valley. The Udokan Mountain Range declines /133 steeply on the north and on the south, in short, on both sides, while the Kalar Mountain Range has its steep decline in the north and declines slowly toward the south.

The Kodar Mountain Range, as seen from the Chara valley, represents a single closed mass, its high plain character being clearly recognizable. Through erosion this range has been broken into individual blocks. The Quarternary glaciation has contributed to widening and reforming the valleys. Most heavily cut up is the steep southern slope. The gol'tsy resting on the surface of the massif attain an absolute height of approximately 2,000 meters.

The Udokan Mountain Range in its picture shows a far greater unevenness than the Kodar Mountain Range. The former clod is broken up into irregular parts, which lie at various heights. Here, too, erosion has participated very strongly in the destruction of the original forms. Most strongly torn up is the decline toward the east to the valley of the Olekma. The highest places in the mountain ranges, especially in the area where the Udokan runs into the Kalar Mountain Range, received their present-day face through the Quarternary glaciation, whose traces are visible everywhere and give this part of the mountain range an Alpine appearance. But, in addition, there are also level high plains in the Udokan Mountain Range. In these high plains the original form of the post-Tertiary peneplain is visible.

Aside from the parts where it unites with /236/ the Ukokan Mountain Range, the Kalar Mountain Range generally has more high plains and flat gol'tsy, whose slopes are saturated with pieces of rock and boulders. The Kalar has preserved its plateau-like character better than the Udokan Mountain Range. Toward the south the Kalar slopes slowly to the middle and lower course of the Kalar valley.

The greatest part of the Olekma Highland is overgrown with [137] thick taiga; only the high gol'tsy project beyond these forests and are covered with bent wood or tundra vegetation. The highest mountains are without any form of plant growth. The swampiness is generally very great. It occurs most heavily in the level high plains and the valley depressions. The valley of the Chara especially is very heavily covered with swamps, just as generally the valleys opening toward the north suffer more from much too much dampness than the valleys opening toward the south. However, already here lonely Russian [311] settlements are found, in which agriculture is pursued. Tungus reindeer breeders are known in the valleys of the Kalakan and Kalar.

133 [316] [487] Gold streams are mined on the Ketemakhta, a left tributary of the upper Kalar. Connection with the outside world is provided by mountain paths, which lead toward the south to the Mogocha Station on the Amur Railroad.

The Olekminsk Stanovik comprises the entire area around the upper course of the Olekma and at the same time forms the watershed for the Amur. The entire region is described as a forest-covered plateau, whose general height lies between 950 and 1,000 meters. The river valleys are mostly deeply etched, and lie 80 to 200 meters below the surface of the plateau. The ridge between the Olekma and its right tributary the Tungir bears the name of Dzhaliro-Tungirskiy Mountain Range; otherwise individual designations are not known. The watershed for the Amur forms a flat ridge, which generally is only 800 to 900 meters high. Toward the south, toward the Amur, this ridge gives way very quickly to hilly country, which is interrupted by the broad valley areas of the numerous waters flowing into the Amur. The most important of these is the Amazar, whose valley
[237] is also used for a stretch by the Amur Railroad. In contrast to the thick larch forests, which cover the bulk of the Stanovik, the vegetation on the slopes inclined toward the Amur includes numerous deciduous trees and thus shows already a more friendly picture. Gold is the
316 most valuable product of the regions. The river valleys between the upper Tungir and the Amazar are especially rich in gold. These valleys are very well opened up because of their nearness to the railroad. The center of gold mining is the city of Mogocha, which has approximately 30,000 inhabitants. It lies on the railroad on the left side of the Amazar. The alluvial sands of the little rivers flowing into the Amur also have gold and, therefore, from early times have
[361] enticed many men who then remained in the land. Accordingly, the entire strip of land between the railroad and the Amur is relatively thickly settled. Worthy of mention here is the valley of the Urusha, which is crossed /237/ by the railroad at the station of the same name. In the vicinity of Urusha brown coal deposits have been determined, and, west of Urusha in the vicinity of the Yerofei Pavlovich station (which has more than 20,000 inhabitants), there are also usable tin deposits.

The Oldoy-Zeya Mountain Country

133 East of the area around the upper course of the Olekma, the

Amur country begins with the Oldoy-Zeya Highland. This highland comprises the drainage area of the Oldoy and of the upper and middle Zeya and extends from the Amur into the region of Uda Bay on the Sea of Okhotsk. Turning first toward the north and then toward the east, this region comprises the areas on the lower Zeya and Bureya, i.e., the interior Amur regions, which lie lower and which are for the most part flat.

In the west the region is bordered by the watershed between the Amur and the Olekma, and the Oldoy and Nyukzha; and on the north the region is bordered by the watershed to the Aldan, which runs along on the Stanovoy. The eastern border is formed by the watershed for the Uda and the upper and middle Bureya. The area around the source of the Selemdzha with its mountain chains and the Turana ridge with the Bureya Mountain Range will be discussed later. In contrast to Transbaykal with its rich alternation of narrow mountain chains and valley depressions, here we deal with large relief forms, namely with two long, wide mountain ridges and an almost equally wide depression lying between them. However, the horst form and the plateau-shaped surface of the ridge remain predominant as Baykal characteristics. Thus the region is divided into the mighty, massive Stanovoy in the north, at whose southern foot there clings the extended depression of the upper Zeya; this depression is, then, closed off by a long mountain chain running in a parallel strip. This long mountain chain consists of three parts following one another from west to east: the Yankan, Tukuringra, and Dzhagday. In addition, there is the fourth individual section, the Oldoy Highland in the west between the Yankan and the Amur.

The Stanovoy is generally still very little explored. It is, however, certain today that the former conception of a watershed mountain chain does not correspond to reality, but rather that the Stanovoy represents much more an entire mountain range system, which extend in a continuing width of 100 kilometers or more from the Olekma almost to the coast of the Sea of Okhotsk. According to Tanfiliev (207), the Stanovoy system is divided into three relief zones running parallel to one another. Forming the northern edge and lying between soft

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207. Tanfiliev, G.I. Geografiia Rossii: Relief Aziatskoi Rossii /Geography of Russia: The Relief of Asiatic Russia/. 2 vols. Odessa, 1923.

133 forms is a train of numerous, sharply set off groups and series of gol'tsy, which for the most part consist of eruptive stone and then project in especially strongly profiled mountain forms. The middle zone constitutes a plateau-shaped, /238/ /Sketch Showing the Morphological Profile of the Stanovoy Ridge from Bomnak on the Zeya to Great Toko Lake in the area around the source of the Aldan tributary, the Uchur, according to N.I. Prokhorov./ elevated ridge and is very broadly built up. Groups of mountains occur extremely rarely here. The character of a mountain range is often lost entirely, especially in the eastern half, and for the traveler there arises the impression of a vast, rolling plain; this impression is strengthened by the great swampiness and the numerous lakes imbedded there. On this high plain most of the rivers have their beginning, both those rivers flowing toward the north to the Aldan (Lena system) and also those flowing toward the south to the Zeya. The watershed is, therefore, not clearly determined by the relief, but rather it is very jagged. Therefore, many rivers also flow locally in a broad circle along the plateau, such as the Tok River, which follows this direction for more than 50 kilometers before it turns toward the south to the Zeya. The plateau-shaped ridge generally lies at an absolute height of approximately 1,000 meters; the highest places reach 1,300 to 1,450 meters. The northern border zone projects somewhat beyond the high plain, which, however, in the eastern part, north of the source rivers of the Zeya, has more considerable heights. The highest point here is measured at 2,482 meters. The southern border of the plateau again forms a more marked mountain landscape, but here there are only flat groups of gol'tsy without the character of a mountain range, and this section is not built up equally everywhere. As a rule the southern slope is formed by individual plateau sections, flatly inclined toward the south. Between these plateau sections lie valleys, which quickly become wider and which without a break go directly into the depression of the upper Zeya. As Ahnert (17) who crossed the

17. Ahnert, E. von. Zwei Überquerungen der Stanowoj-Wasserscheide /Two Crossings of the Stanovoy Watershed/ (Russian). Geologische Forschungen in den Goldgebieten des Amur-und Küstengebiets /Geological Research in the Gold Regions of the Amur and the Maritime Regions/, Vol. VIII. Petersburg, 1908.

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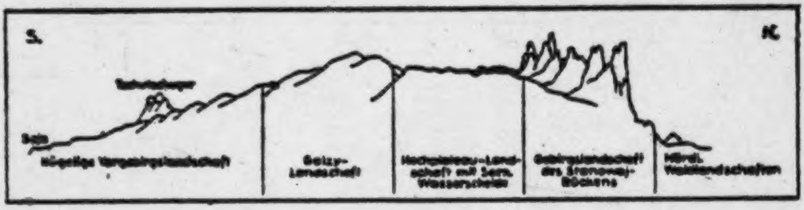

S.
N.
Tschutschugur
Seja
Hügelige Vorgebirgslandschaft
Golez-Landschaft
Hochplateau-Landschaft mit Seen, Wasserscheide
Gebirgslandschaft des Stanowoj-Rückens
Nördl. Waldlandschaften

Sketch Showing the Morphological Profile of the Stanovoy Ridge from Bomnak on the Zeya to Great Toko Lake in the area around the source of the Aldan tributary, the Uchur, according to N.I. Prokhorov. The sections of the profile are as follows: Zeya, headland landscape, Chuchugur; gol'tsy landscape; high plateau landscape with lakes, watershed; mountain range landscape of the Stanovoy Ridge; northern forest landscapes.

133

Stanovoy in two places, reports, it is characteristic of the entire structure of the Stanovoy that the plateau in the middle slopes both toward the north and also toward the south in step-shaped breaks, which stretch in a latitudinal direction. Also in terms of landscape there is a difference between the two outer zones. In the north the valleys are mostly filled with forest, and only the deepest places are taken up by moss hills and moss swamps, while the heights appear bare of forest and are covered with rock ruins and boulders or consist of smooth, steeply towering, contiguous bare rock. In the south, on the other hand, /239/ all the heights have thick forests, and only the valley areas are without forest, as a consequence of the greater swampiness. In contrast to the rest of the Stanovoy, the area around the source of the Zeya is also mountainous in the south. [137]

South of the Stanovoy stretches the upper Zeya's broad graben depression which is filled with forests and swamps. Opposite it and coming from the west is the valley of the Gilyuy which is significantly narrower. Both are among the richest gold fields in the Far Eastern regions and are, therefore, better known. The valley floors and even the gentle plateau slopes are mostly covered with a thick layer of moss drenched with dampness, while thick larch taiga grows on the better-drained slopes and elevated places. Deciduous trees occur here only very rarely. As a consequence of the predominant permanently frozen earth, there are often moss hills containing ice cores. These hills are often several meters high, and, if they appear in large numbers, they give rise to a landscape similar to a hill tundra. The crossing of such moss swamps is made difficult by the fact that the frozen earth has gaps, probably because of warm springs, and, accordingly in such places one can sink to unfathomable depths. Where gold mining is pursued, the taiga as a rule is destroyed beforehand by forest fires set off intentionally. The taiga thus gives way to a horrible, plundered landscape, in which there are numerous, deserted huts, which, overgrown with bushes, are falling into ruin and increase still more the despair of the picture. The region does not have larger localities. There are some villages, such as Potekhino and Bryatan in the center of the depression, in which there are larger supply warehouses from which the widely scattered settlements of gold washers are supplied. The extraction of gold, now run by the state, brings rich yields and has made the depression into one of the most important gold areas in the Far East. The gold streams lie along the Zeya and the Gilyuy and their tributaries. The very great swampiness and the existence of [316] [137] [361] [316]

133 permafrost, however, create great difficulties. Development of the
area is hampered by the area's remoteness and the difficulty of gaining
access to it, since the break-through valley of the Zeya toward the
[505] south represents the sole gateway to the depression. To date the
supplying of the area has been done on the water route as far as the
locality of Zeya, for the Zeya River is navigable to this point. The
[491] supplies are then brought by vehicles further up the river. The area
around the upper course of the Gilyuy is crossed by the highway from
Never to Yakutsk. This highway crosses the Tyndinsk, a tributary of
[496] the Gilyuy, at Tyndinsk. The new Baykal-Amur Railroad, coming
from the Nyukzha valley, is also supposed to enter the valley of the
Gilyuy at the same place and to follow the Gilyuy as far as the Zeya,
in order then likewise to use the Zeya's break-through valley as an
exit toward the south. The laying of this railroad line through the
Zeya-Gilyuy depression is expected to lead not only to better opportunities
for exploiting the gold fields but also to the use of the rich supplies
of wood in the forests, and finally also to better settlement of the
area.

/240/ The depression of the upper Zeya and Gilyuy is cut off into a vast basin on the south by a watershed mountain chain. The Zeya is the sole river flowing off to the south in this basin. This mountain chain is regarded as a continuation of the Daur and the Shilka mountain ranges; it stretches from Transbaykal via the Olekminsk Stanovik to the depressions of the Amgun (left tributary of the lower Amur) (207). This entire line of mountain ranges was, according to Ahnert (16), formed partly by faulting but principally and especially on the southern edge, by break formations. Within the Oldoy-Zeya Highland the chain of mountain ranges begins in the west with the Yankan Mountain Range, which lies between the upper courses of the

207. Tanfiliev, G.I., Geografiia Rossii: Relief Aziatskoi Rossii /Geography of Russia: The Relief of Asiatic Russia/, 2 vols., (Odessa, 1923), p. 250.

16. Anert /sic/, E. E. Kratkii geologicheskii ocherk Priamuria /Short Geological Sketch of the Amur Region/. Geological Research in the Gold Regions of Siberia, Vol. XVII. Petersburg, 1913.

Oldoy and of the Great Urkan. Without a prominent delimitation the Yankan extends out from the Olekminsk Stanovik toward the east and also shows a gradual transition through the dissolution of the plateau-shaped surface, both toward the north to the area around the upper course of the Gilyuy and also toward the south to the Amur. The Tukuringra Mountain Range stands out far more sharply in its isolation, since it forms the demarcation line between two marked depressions, i.e., between the already mentioned depression on the upper Zeya and the Gilyuy in the north and the wide Zeya-Bureya plain in the south, which here projects toward the north as far as the foot of the mountain range. The Tukuringra Mountain Range consists principally of metamorphic rock and in part of gneiss and crystalline slate. It is heavily cut up by extensive erosion and divided into individual massifs, which in part also go back to vertical dislocations. The surface is characterized by the usual plateau form with peaks and gol'tsy set on it. The gol'tsy often stand close to one another and not uncommonly form a middle mountain range landscape with significant differences in height. The general height of the plateau area is 900 to 1,000 meters, while the peaks project 500 to 600 meters beyond this. A great part of the mountain range is covered with thick taiga, and only the highest gol'tsy are without forests. Accompanying the Siberian types of trees are numerous deciduous trees on the southern slopes. These deciduous trees give a more friendly stamp to the picture of the landscape. However, along with the moderation of the climatic conditions, an extraordinarily thick underwood sets in at the same time. This underwood is very much of a hindrance to man's advance, and, accordingly, despite the lighter colors, the landscape's animosity to cultivation remains here too--a quality which especially distinguishes all these mountainous regions. 133 [137]

From the Dep River, a left tributary of the middle Zeya, the continuation of the chain of mountain ranges toward the east bears the name of Dzhagdy Mountain Range. A cross-connection from it toward the north to the Stanovoy forms the eastern cut-off of the upper Zeya depression and at the same time the watershed between the Zeya and the Uda. This remote mountain barrier is as good as not explored at all. In its central part it is supposed to be 2,000 meters and more high. The Dzhagdy Mountain Range itself continues generally toward the east with a change several times in its direction. -/241/ It divides the drainage area of the Uda from the Selemdzha, the largest left tributary of the Zeya, and then goes over into the Bureya Highland, whose

133 northern edge it represents.

The Oldoy Highland is the smallest part of the region as a whole, and it comprises the area between the Yankan Mountain Range and the Amur. Already from the region around the source of the Oldoy toward the south the landscape flattens out and dissolves into individual ridges, mountains, and valley areas, giving the overall impression of a mountainous and hilly landscape. Toward the southeast, between the Urkan and the Amur, the broad hill ridges gradually disappear altogether, and the landscape here flows into the so-called Amur-Zeya plateau, which already belongs to the greater landscape of the Zeya-Bureya plain area.

491 The Oldoy Highland is traversed in the north by the Amur 496 Railroad, from which a railroad line to the Amur harbor of Dzhalinda branches off in Skovorodino (more than 20,000 inhabitants), the seat of a railroad office. Thus, in terms of transportation, this region is quite well opened up. This is also true of the most heavily populated parts within the overall region. The alluvial sands of the rivers to the north of the Amur Railroad, especially the valleys of the upper Oldoy, and of the Great and Lesser Urkan, are rich in gold. The built-up highway which is mentioned above and which can be used throughout the year, leads from the station of Never (around 10,000 inhabitants). This highway crosses the Tukuringra Mountain Range and the Stanovoy in its western part and goes via the Aldan gold fields to Yakutsk. It reaches Tyndinsk in the area around the upper course of the Gilyuy. This important highway has recently been supplemented by a railroad line from Skovorodino to Tyndinsk, where there is a spur to the great Baykal-Amur Railroad (BAM). With this a direct cross-connection between the Amur shipping and the BAM is supposed to be created. The new railroad line, in addition, opens up new areas for settlement, just as the construction of the Amur Railroad has become a pacemaker for heavier settlement by an agricultural population. Also in the less swampy valley areas between the railroad and the Amur River agriculture is 361 pursued relatively actively. Accordingly, a lively food industry and also machine building shops and repair shops have been able to develop in Skovorodino, which has already been named as the center of the Oldoy Highland. Brown coal, which is mined in the vicinity, is used as the raw material for energy. To the north of the city tin supplies [509] have been determined. An airfield in the vicinity connects Skovorodino to the great airline running from Moscow to Khabarovsk to Vladivostok.

The Zeya-Bureya Plain

This area is the section of the Amur country which is the richest 133 in population and which is the best opened up economically. The easily accessible plain, the milder climate, the fertile soil have from early times /242/ caused a relatively heavy population to settle here, and pursue agriculture. This plain is the granary of the Amur region; 80 [311] percent of the total area under cultivation in the region lies here.

The region falls into two sections: the Amur-Zeya plateau in the west and the great Zeya-Bureya lowland, which extends east of the lower course of the Zeya along the Amur as far as the Bureya Mountain Range.

The Amur-Zeya plateau takes up the western part. This plateau stretches between the Zeya, its tributary the Urkan, and the Amur. The plateau declines slowly from the northwest to the southeast; the interior sections are gently rolling open country; on the other hand, the rivers toward the outside have dug deep gorges. The plateau breaks off sharply toward the lower Zeya and toward the Amur. On the right bank of the lower Zeya the decline becomes 180 to 240 meters deep and, with its heavy gorge formations, gives the impression of a mountain when viewed from the eastern "meadow shore." On the Amur the plateau lies 100 to 120 meters above the river at most, but only very rarely does the plateau come near the river. Here between Chernyayevo and Blagoveshchensk, the Amur valley has four terraces. The lowest one is exposed only when the water is low. Adjoining it with a step up of 4 to 6 meters, and, in places even 8 meters, is the meadow terrace with sandy, gravelly, and muddy deposits. This terrace is considerably wider and is regularly flooded when the water is high. The next middle terrace lies 10 to 20 meters above the normal water level and also breaks off precipitously toward the second terrace mentioned above. Forming a steep bank, this terrace also goes right to the path of the water in many places. There are already settlements in many places on it. The fourth or upper terrace attains a height of 50 to 60 meters and is less clearly set off. The northwestern [137] part of the plateau still has a thick forest covering, but here the percentage of deciduous trees is very considerable. Toward the southeast the thickness of the forests decreases, and they gradually give way to a type of forest steppe. Characteristic of this section are little birch forests and extensive swamps and swamp meadows. Accordingly, livestock breeding predominates among the Russians settled here.

3: Thiel--278 K-4,5 (no date) 1953 RR1 Siberia RR1

361 Only in the southeast in the triangle between the Amur and the lower
Zeya is there an agricultural settlement covering an area of any size.
In the rest of this region a zone of settlements with many gaps ac-
companies the Amur and the railroad.

496 The Amur Railroad runs approximately along the middle of the
plateau and uses the watershed exactly, since along the watershed there
was, for understandable reasons, the best and the easiest opportunity
for marking off. A branch railroad, 38 kilometers long, leads from
Ushumun station to Chernyayevo on the Amur, in the center of a
135 region with great prospects for the future, for here only a few years
ago hard coal deposits were determined. These deposits stretch along
the left side of the Amur between its tributaries, the Urinda and
Magdagachi, i.e., approximately around the locality of Chernyayevo
mentioned above. The coal is of Jurassic age and lies in individual
anticlines, which stretch toward the northeast. Although, judging
from individual tests, the ash content of the coal is supposed to be
great, the deposits have a prominent significance because they lie
in a region /243/ /Sketch Map of the Amur Oblast:/ which formerly
had to be supplied with coal from a great distance. In some places
the coal-bearing layers are broken through by granite laccolite and
porphyry effusions, and thus the coal here has been transformed into
valuable semi-anthracite and full anthracite. Nothing is known of
the total supply in the deposit designated by the Russians as the "Upper
Amur Coal Basin." There are numerous outcroppings on the Amur and
in the individual river valleys. Very recently the mining of the coal
deposits in the vicinity of Madgagachi has begun.

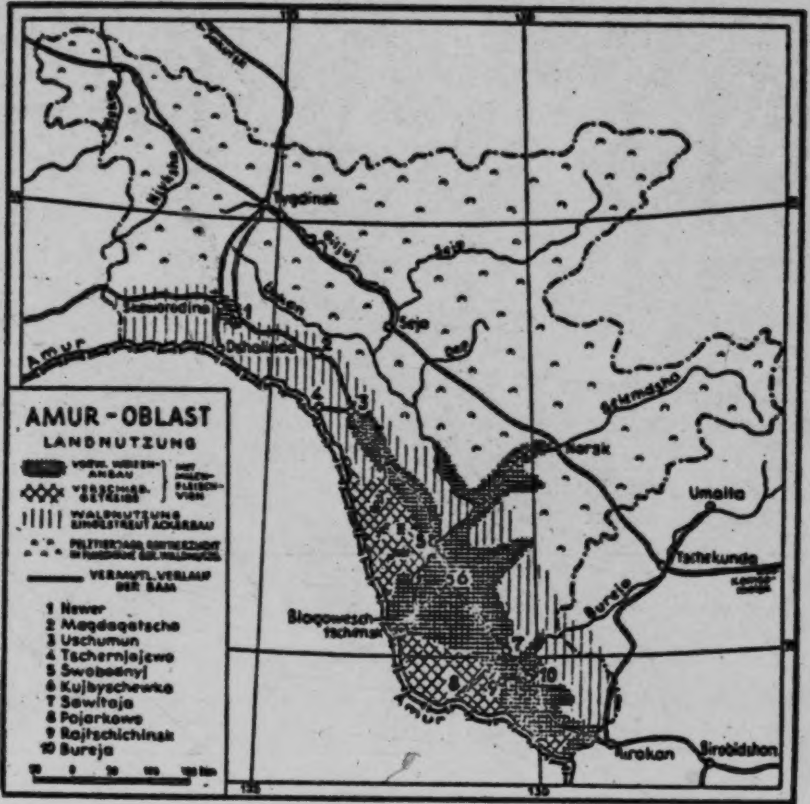
361 The principal locality in the northwestern part of the plateau
is Magdagachi (approximately 10,000 inhabitants); the principal
locality in the southeastern part is Shumanovskaya (approximately
25,000 inhabitants). Both of these towns lie on the Amur Railroad.
[487] The Tygda station between Madgadachi and Ushumun has greater
significance in terms of transportation. A land route leads from Tygda
via Ovsyanka, which lies at the point where the Zeya and the Urkan
flow together, to the Tukuringra break-through of the Zeya. This is
the shortest land route connection from the Amur Railroad to the
gold fields on the upper Zeya and the Gilyuy.

133 /244/ East of the lower Zeya begins the Zeya-Bureya Lowland,
which stretches toward the east along the Amur over a broad area
extending beyond the lower course of the Bureya. The end of this
low plain is prepared by the high embankment of the Bureya Mountain

3: Thiel--279 K-4,5 (no date) 1953 RR1 Siberia RR1

Sketch Map of the Amur Oblast: Land Exploitation:

634
311


AMUR - OBLAST
LANDNUTZUNG
VORW. WEIZEN-ANBAU
VERSCHIED. GETREIDE
MIT MILCH- FLEISCH-VIEH
WALDNUTZUNG EINGESTREUT ACKERBAU
VERMUTL. VERLAUF DER BAM
1 Newer
2 Magdagatscha
3 Uschumun
4 Tschernjajewo
5 Swobodnyj
6 Kujbyschewka
7 Sawitaja
8 Pojarkowo
9 Rajtschichinsk
10 Bureja
Amur
Skoworodino
Dshalinda
Tyndinsk
Sejja
Sejja
Norsk
Umalta
Tschekunda
Bureja
Blagowetschtschensk
Birokan
Birobidshan
Amur
120
130

▦ Predominantly cultivation of wheat } with dairy and meat livestock

▨ Various grains } with dairy and meat livestock

||| Exploitation of the forests intermixed with scattered agriculture

◠◠ Hunting of fur-bearing animals, breeding of reindeer, slight exploitation of the forests near the rivers

═ Presumed course of the BAM

1. Never
2. Magdagachi
3. Ushumun
4. Chernyayevo
5. Svobodnyy
6. Kuybyshevka
7. Zavitaya
8. Poyarkovo
9. Raychikhinsk
10. Bureya

Range, which here goes up to the Amur. Toward the north the plain extends into the river area of the Selemdzha as far as the spurs of the Tukuringra Mountain Range. Vast plains, formed by Tertiary fresh water deposits, warm, damp summers, extensive agriculture, a heavy population, numerous villages and little cities--all these are the main distinguishing marks of this region. 133

The southern part along the lower courses of the rivers is almost completely level and is often covered with old waters, swamps, and lakes. But even here dry islands rise in long, flat waves in the areas between the rivers. Morphologically, however, these dry islands are scarcely striking in the plains which generally predominate. Instead, something of a change in the vast monotony is brought by the paths of the rivers, all of which have a marked steep right bank which though not high, is still heavily gorged. The left meadow shore, which mostly is covered with swamps, then rises gradually to the watershed areas. The Bureya continues to show this asymmetrical shore formation even far into the mountain country. North of the Tom', a left tributary of the Zeya, the relief changes. It becomes rolling, hilly, and rises gradually toward the north. Here ends the contiguous 133 meadow steppe, which in its natural state has grasses as tall as a man 137 growing on it. These grasses have brought the steppe the name of "Amur Prairie." This meadow steppe makes way for a magnificent, peculiar forest steppe, in which the hills and high places are covered like islands with oak forests or bushes, while the meadow steppe continues in the lower spots. The dampness of the soil decreases, even though in spots there are often swampy places in the loamy soil. With the further rise toward the north the differences in height become greater, the valley areas become deeper and narrower. Coniferous trees appear on the mountains. The swampiness of the valleys begins to increase again. Slowly the dark taiga takes possession of the entire land, while in the background the rocky peaks of individual gol'tsy already rise from the contiguous greenery.

The significance of the Zeya-Bureya plain is based on the extraordinary fertility of its soil. Tomashevskii (219) has investigated 134

219. Tomashevskii, I. I. Pochvy iugozapadnoi chasti Zeiskobureinskogo vodorazdela /The Soil of the Southwestern Part of the Zeya-Bureya Watershed/. Works of the Amur Expedition, Vol. XV. Petersburg, 1912.

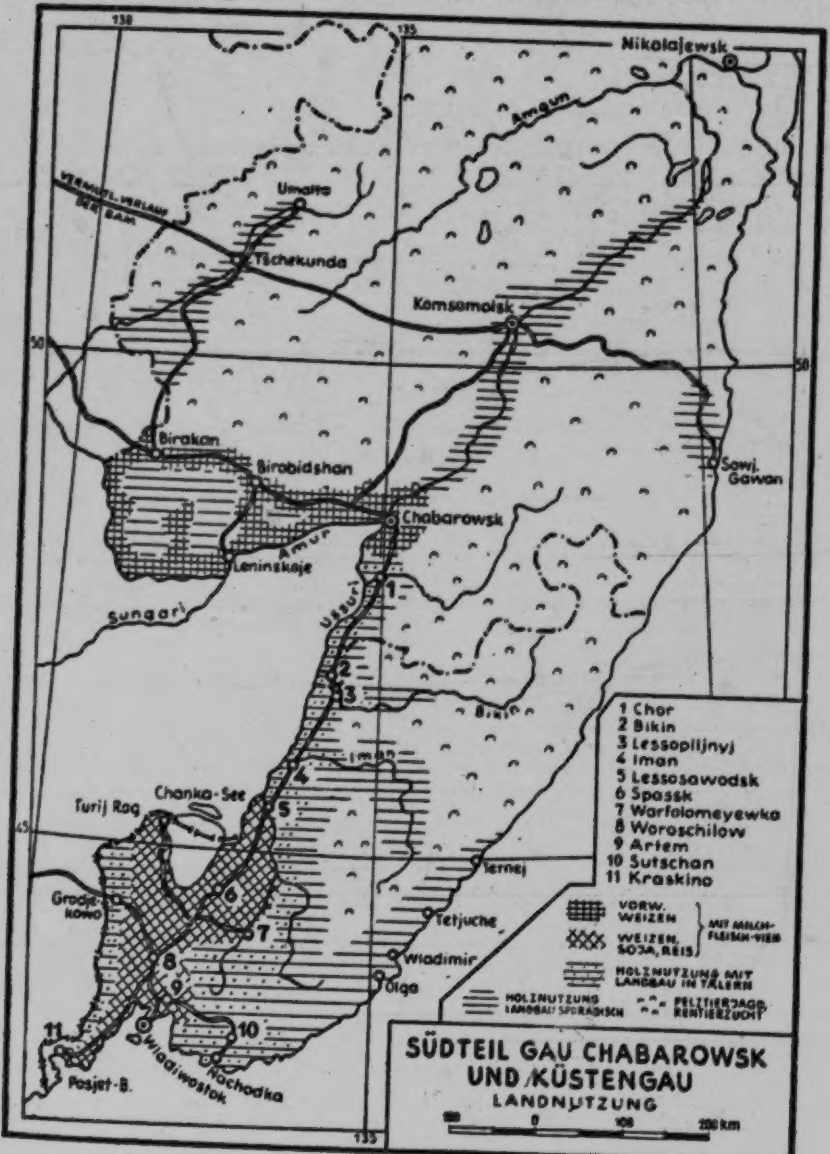
134 a large part of this region in this connection. In the southwest soils of intensive black color have developed on the heavy loam. This soil is covered with meadows and pastures with high grass. The black color is the reason that the first explorers put this soil in the category of black earth, and even today this soil is designated still as "chernozem" by the native population. But this is not black earth, for it lacks the granular structure, and also the heaping up of carbonates cannot be determined. During the summer the humus horizon is soaked with water, and in horizon B regeneration processes /245/ /Sketch Map of the Southern Part of Khabarovsk Krai and the Maritime Krai:/7/246/ go forward, which often point to light podsolization. This semi-marshy meadow soil, as Tomashevskii calls it, is, however, not inferior to black earth in fertility and is in a position to produce excellent wheat harvests year after year without any fertilization. As a rule this soil lies in higher places at some distance from the river valley areas, and it covers more than half a million hectares. Somewhat less fertile is a type of soil which is distributed in the deeper depressions and is likewise semi-marshy. This type of soil bears the designation of "miasigi" (kneaded mass /Knetmasse/) among the native population. Here, too, the deep black, upper horizon of soil has developed on heavy loam, but the signs of regeneration are more sharply marked. During the summer dampness horizon B becomes tough, sticky, and viscid like dough, so that, horses sink into the earth and the soil can be worked only with difficulty. In its natural state the "miasigi" is covered predominantly with sedge (Calamagrostis) and moss (Polytrichum) and thus already in its external picture stands out from the relatively drier soils. [137] Brighter podsol soils take up a large part of the Zeya-Bureya plain, especially toward the north and east, with white birches settling by nature on the heavier soils and black birches and oaks on the lighter soils. These trees were already known to the first Russian settlers as indications of the soil. The bleaching out varies gradually and is generally slight. The fertility of this soil is supposed to be equal to that of black earth. Above all this soil can be easily worked since the drainage is better.

During the dry period the Zeya-Bureya plain recalls the black earth steppes of southern Russia. However, during the rainy period the picture changes completely. Flat basins fill up to become lakes, valleys are flooded, and water even remains standing in level areas. Thus Tomashevskii has been very surprised how anyone could ever have arrived at the thought that black earth has formed here. The

7/1 [Cf. Cat. 116, pp. 282-283--Analyst]

634
311

Sketch Map of the Southern Part of Khabarovsk Krai and the Maritime Krai: Land Exploitation:


130
135
Nikolajewsk
Amgun
VERMUTL. VERLAUF BAM
Umalta
Tschekunda
Komsomolsk
50
Birakan
Birobidshan
Sowj. Gawan
Chabarowsk
Amur
Leninskoje
Sungari
Ussuri
1
2
3
Bikin
Iman
4
Chanka-See
Turij Rog
5
45
Ternej
6
Grodjekowo
7
Tetjuche
8
9
Wladimir
Olga
11
10
Wladiwostok
Nachodka
Posjet-B.
1 Chor
2 Bikin
3 Lessopiljnyj
4 Iman
5 Lessosawodsk
6 Spassk
7 Warfolomeyewka
8 Woroschilow
9 Artem
10 Sutschan
11 Kraskino
VORW. WEIZEN
WEIZEN, SOJA, REIS
MIT MILCH-FLEISCH-VIEH
HOLZNUTZUNG MIT LANDBAU IN TÄLERN
HOLZNUTZUNG LANDBAU SPORADISCH
PELZTIERJAGD RENTIERZUCHT
SÜDTEIL GAU CHABAROWSK UND KÜSTENGAU
LANDNUTZUNG
100
0
100
200 km
135

(Captions to map on following page)

(Captions to Map on page 282)

1. Khor
2. Bikin
3. Lesopil'noye
4. Iman
5. Lesozavodsk
6. Spassk
7. Varfolomeyevka
8. Voroshilov
9. Artem
10. Suchan
11. Kraskino

▦ Predominantly wheat } with dairy and meat livestock
▩ Wheat, soy beans, rice } with dairy and meat livestock
▤ Exploitation of wood with agriculture in the valleys
☰ Exploitation of wood with sporadic agriculture
ᴖᴖᴖ Hunting of fur-bearing animals, reindeer breeding

black earth regions in southern Russia have a damp spring and a dry summer. Here it is the reverse: the spring is dry; the summer, on the other hand, is very damp. 134

On the lower Bureya red earth is diffused under lightly podsolized soil. This red earth is the product of the weathering of gray Tertiary slate, and it owes its brick red color to enrichment by iron oxide. This red earth indicates that the climate of the Tertiary period must have been much warmer than it is at present. Also on the lower Amur the same Tertiary red earth has been determined. "Grapes, cork trees, and tigers are vestiges of that time when the red earth was forming, while pines, firs, and reindeers harmonize very well with the present-day formation of soil of the podsol and swamp type," says Glinka (70).

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70. Glinka, K.D. O drevnikh protsessakh vyvetrivanniia v Priamurie /On the Old Weathering Processes in the Amur Region/. Pochvovedniie, 1911.

Region/. Pochvovedniie, 1911.

133 The northern part of the Zeya-Bureya plain lies generally below 500 meters above sea level and declines toward the lower Zeya and the Amur, /247/ /Sketch Map:/ /248/ where the greatest part lies at less than 200 meters above sea level. At Blagoveshchensk the Amur has a height of 120 meters. In individual places the substratum comes out from the flatly deposited Tertiary layers in the form of individual rocks, which consist of granite, Jurassic conglomerates and Jurassic sandstone, or also of porphyry.

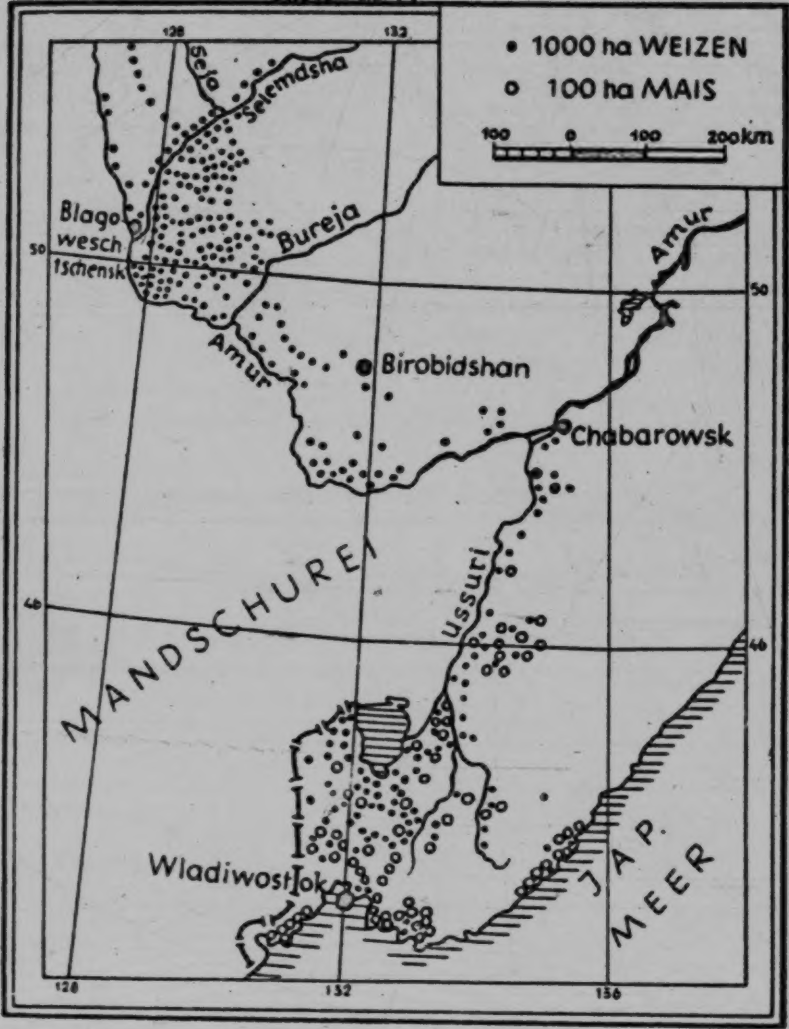
The great dampness of the Zeya-Bureya plain, which arises from the excessive summer rainfall, leads in the unlevel regions to hanging landslips and solifluction phenomena of manifold types, which cause great difficulties in the construction of roads and installation of railroads, especially when--as, for example, in the country of mountain spurs--permafrost appears. The peasant fights constantly [311] against threatening swampiness by draining his land. Despite these difficulties, the area under cultivation is increasing continually. The swamps, which as a rule are covered with clusters of grass, are turned into hay fields by fires set off every year, and these hay fields in turn are then turned into cultivated land.

361 Settlement is very thick, and in the valley area of the Zeya, Selemdzha, and Bureya it penetrates farther and farther into the interior. In the plains one can often see from one village to the next one. The settlements differ in no respect from those in the Russian homeland. And when in mid-summer sunflower fields glow between the yellow gold of wheat fields, one might feel himself transported [214] to southern Russia. The cultivation of soy beans and perilla, which here lays claim to a significant percentage of the area under cultivation, [496] appears foreign, however. The railroad crosses the Zeya at Svobodnyy (10,000 inhabitants), where an active wood industry has developed. A branch railroad, which is 108 kilometers long, leads from Kuybyshevska with its more than 10,000 inhabitants to Blagoveshchensk (58,700 inhabitants), the capital of the region. The city extends along the shore of the Amur for a distance of almost 8 kilometers, toward the mouth of the Zeya. The Zeya here is 2 kilometers wide and exceeds even the Amur into which it flows. The city is the center of the entire agricultural area and has numerous flour and oil mills. In addition, the processing of lumber also plays a large role. The lumber is floated here on the Zeya and the Amur. Opposite Blagoveshchensk,

3: Thiel--285 K-4,5(no date) 1953 RR1 Siberia RR1

Sketch Map:

243


• 1000 ha WEIZEN
o 100 ha MAIS
100
0
100
200km
128
132
136
50
46
Seja
Selemdsha
Blagowesch tschensk
Bureja
Amur
Amur
Birobidshan
Chabarowsk
Ussuri
MANDSCHUREI
Wladiwostok
JAP. MEER

● 1,000 hectares of wheat

O 100 hectares of corn

on the Manchurian side, lies the city of Heino (Sakhalyan), from whence there is a spur to the railroad network of Manchuria. The area around the lower course of the Bureya has the same character in terms of landscape as do the plains on the Zeya. The nearness of the highland permits the basic rock to come out more often here. The population is likewise dense and in the valley of the Bureya penetrates farther toward the north into the highland. The center of the region is the little city of Bureya, which lies at the point where the railroad crosses the Bureya River. A railroad line, which is 43 kilometers long, branches off from here to Raychikhinsk, the center of the largest brown coal deposit in the Amur country. Zavitaya, from which a new railroad line has been built to Poyarkovo on the Amur, /249/ has acquired a growing importance during the most recent period. 361 [496]

The brown coal fields lie between the railroad and the Amur and stretch from the Bureya in the east to the Zavitaya in the west, covering an area of 600 square kilometers. Raychikhinsk and Kivdinskiy are the centers of the coal mining. The transporting of the coal is done for the most part by railroad to the Bureya station, where there are opportunities to transfer the goods to river shipping. 316

The northern part of the Zeya-Bureya plain is drained primarily by the Selemdzha. The population here decreases rapidly toward the north, and settlement is limited to the valley areas of the rivers. On the Zeya, settlement reaches to the town of the same name at the foot of the Tukuringra Mountain Range; and on the Selemdzha, settlement ends approximately at Norsk. Both rivers are regularly traveled by steamships as far as the localities named. With the new construction of the BAM, which goes from the middle Zeya and runs through the area toward the east and crosses over the Selemdzha at the locality of Norsk mentioned above, new prospects have opened up for the further development of these regions, which are favorable for settlement but which in the past were too remote. 361 [505]

The Bureya Mountain Country

The Bureya Highland has a central position in the Amur country. It forces the Amur to make its large southern bend; and, in the south where it joins the Little Khingan, it makes a path to the east free for the Amur only in a narrow break-through valley. In the same place the Bureya Highland shoves itself like a wedge into the great depressions running along the Amur and separates the Zeya-Bureya plain in the 133

133 west from the depressions on the lower Amur and Amgun.

For the most part the highland comprises, as its inner zone, the drainage area of the Bureya, which also is bordered by the two main chains of the highland: i.e., in the west by the Turana Ridge, which is the watershed toward the Zeya, and in the east by the Bureya Mountain Range, which represents the watershed toward the lower Amur.

The Bureya Mountain Range forms the backbone of the highland. It begins on the Amur as the continuation of the Little Khingan which stretches from Manchuria over the river toward the northeast. The Bureya Range is, therefore, also known under the name of Little Khingan. But here the Russian geographers, who designated the mountain chain generally as the Bureya Mountain Range, are to be followed. These mountains run principally toward the northeast, though the direction of individual sections changes from place to place. This continues until the mountain range runs into the already mentioned Dzhagdy Mountain Range, which comes from the west. Here in the north individual sections are known under special names: thus, the Duse-Alin', which in an arc surrounds the left source river of the Bureya (Levaya Bureya), and, adjoining the Duse-Alin' on the north, the Yam-Alin', which flows into the Dzhagdy Mountain Range. The Tam-Alin' and the Dzhagdy border on the north and the east the gold-rich area /250/ around the source and the upper course of the Selemdzha; while from the southern part of the Yam-Alin' a mighty massif, forming a watershed, shoves in toward the west between the Selemdzha and the upper Bureya. Here in the northern part of the Bureya Highland, where immense high plateaus unite in a narrow area, there also lie the highest elevations of the Bureya Mountain Range and also the highest elevations of the entire highland. The Yam-Alin' has several peaks which project 2,000 meters. Its highest point reaches 2,215 meters. Also the watershed massif between the sources of the Selemdzha and the Bureya has several gol'tsy, which are only a little inferior to the Yam-Alin' peaks and which project between 2,115 meters and 2,155 meters.

316 The area around the source of the Selemdzha is rich in gold and has gold-washing installations, which are in part mechanically run. But the remoteness of the region causes the very great difficulties
505 to the works which are directed by the state. The primary supply route is the Selemdzha, which is regularly traveled by steamers as far as Norsk, often designated as Norskiy-Sklad. And under favorable Conditions the Selemdzha is even traveled as far as Selemdzhinsk.

conditions the Selemdzha is even traveled as far as Selemdzhinsk. 000 But then begins a land route which is 250 kilometers long and is 487 laborious to travel. At the end this land route reaches the high-lying gold fields with steep ascents.

From the mighty complex of the high plateaus, which surround 133 the area around the source of the Selemdzha, the highland gradually declines toward the south. The surface of the Bureya Mountain Range is only 600 meters high on the upper course of the Amgun and of the Tunguska (a left tributary of the Amur), and only individual gol'tsy rise to heights of 1,000 meters. The Amur Railroad crosses the mountain range in the Lagaraul Pass at a height of 452 meters, and on the Amur itself the highest mountains only reach a height of 200 meters. The mountains here come in a broad front directly to the river, which breaks through the Khingan-Bureya Mountain Range here between Pashkovo and Yekaterino-Nikolskoye in a narrow valley which is 150 kilometers long. The great masses of water are pressed together here by steeply declining, often bare rocks, which come together in places to form a narrow corridor with high, almost perpendicular walls.

The general impression of the Bureya Mountain Range differs little from that of the Zeya Highland. Here, too, the basic forms permit the plateau-shaped surface to be recognized, and projecting from this plateau surface are numerous gol'tsy. However, all parts of the mountain range here show greater effects of erosion, which undoubtedly goes back to the heavier rainfall. Almost all the rivers, at least in their upper courses, flow in narrow, rocky, deeply etched gorges as long as they remain in the sphere of the plateau-shaped elevations. Then the valley areas quickly widen, and, even though they are often still accompanied by steep, rocky slopes, the valleys extend between the gently inclined slopes of the swampy plateau. But also in the lower places there are still individual cones or summits sitting on the plateau.

The vegetation of the Bureya Highland is /251/ unusually 137 varied. The reason for this lies not only in the changing relief but also primarily in the fact that the elements of three flora regions meet here, namely the East Siberian, Okhotsk, and Manchurian flora regions. In the northern parts of the highland on the mountains and slopes at a height of 600 to 900 meters there are thick forests which consist primarily of Ayan spruce (Picea ajanensis) and fir with white bark (Abies nephrolepsis), with a small number of birches intermixed. The low temperatures, the cool fog, and the strong, damp winds which blow

137 in constantly from the sea in the summer, have given these forests a peculiar appearance. The branches are covered with long lichen, which hang down like beards, and moss grows on the stems as far as the boughs. A thick layer of moss also envelops the earth, and with every step water springs from the damp cushion. In the deeper places and also in the middle part of the highland, larches then appear as forest-formers, and the forests gradually become purely larch forests, and also fill the valley areas as far as the middle courses of the great rivers and press far to the south. The reason for this can be seen above all in the fact that the cold air masses flow down into the valleys and thus prevent the expansion of other types of trees. Only on the lower courses of the rivers flowing toward the south do deciduous trees set in. The larch forests which cover the bulk of the Bureya Highland are economically the most valuable.

316 The valley of the Niman was once among the most famous of the gold fields in the Far East. But the deposits are already exhausted. In their place the gold fields in the area around the upper course of the Bureya have now appeared, but these cannot compete in yield with those of the Selemdzha. The valley of the Bureya serves as the connecting path to the gold dressing installations. 505 When the water level is good, the Bureya can be used by steamers for 345 kilometers as far as the locality of Chekunda, and occasionally even as far as Umal'ta. From Chekunda down the greater drops already work so strongly against water vessels that from here on the boats as a rule have to be drawn by horses. 487 The last part of the way then is traveled by car or with riding horses and pack horses. An extension of this route toward the east leads over a pass, which is more than 1,000 meters high, to the gold fields on the upper course of the Kerbi, a tributary of the Amgun, which already belongs to the lower Amur. This much-traveled old Bureya gold route has today for the most part lost the importance it once had, since rich deposits of molybdenum and especially of coal have been found in the valley of the upper Bureya and a railroad has been built there.

316 There is molybdenum in the valley of the Umal'ta, a left tributary of the upper Bureya. Here a great molybdenum works has been erected in Ust'-Umal'ta. The hard coal deposits fall into two parts, into the deposit on the upper Bureya and the Tyrma deposit, which are separated from one another only by tectonic occurrences with succeeding erosion. 496 For the /252/ opening up of these deposits a railroad line is being built from Izvestkovyy, which lies west of Birakan on the Amur Railroad. This new railroad line leads over the Bureya

Mountain Range to the upper course of the Tyrma and then follows 496
this river to the point where it empties into the Bureya. The railroad had already been completed as far as Ust'-Tyrma in 1942. Since then the construction of this railroad, which now runs parallel to the course of the Bureya, has been continued via Chekunda to Umal'ta. With this an outlet has been created for Bureya coal toward the south to the Amur Railroad, but the waterway of the Bureya is also used to transport
the coal away. The expansion of this waterway is being worked on. [505]
In addition, there is the fact that the Baykal-Amur Railroad also crosses the same region. This railroad leaves the Selemdzha at Norsk, crosses the Turana Ridge and reaches the middle course of the Bureya at Chekunda, to continue further over the Bureya Mountain Range to Komsomol'sk.

The construction of both these railroads in the sphere of the 438
Bureya Mountain Range has above all an industrial significance. Next to coal, wood is the most important item for transport which this region can supply. In the traffic going the other way, the bringing in of food is probably the main task of the railroads. The Bureya also plays a certain role in this connection; for, according to various reports, continuous loads of grain go up the river during the period when it is navigable. The supplying of the new Bureya coal region must be assured from outside because the Bureya valley itself is very unfavorable for
agricultural settlement. Everywhere here the Bureya has the character 133
of a mountain river. Its valley between Ust'-Umal'ta and Ust'-Niman is up to 3 kilometers wide, but the river, which here is very wild, regularly floods a part of this country and causes extensive swampiness. From Ust'-Niman to Chekunda the right bank is steep and rocky; the left bank is, to be sure, level, but it is taken up by swamps which are difficult to travel. Below Chekunda as far as the settlement of Paykan the valley narrows, and on both sides the rocky mountains come right down to the shore. Only shortly before leaving the mountain ranges does the valley meadow widen into an area favorable for settlement. Thus the prospects for agrarian settlement in the area of the Bureya valley are not very good, and it will require long years of difficult cultivation work before the new coal mining region will be able to supply its own food.

If we survey the entire Bureya Highland, then, it can be deter- 361
mined that, apart from the spottily occupied gold regions in the north and apart from the Bureya and Tyrma valleys which are now filling up with people in a limited area, the other regions are as good as

361 uninhabited except for in the southern part. Heavier settlement in terms of area covered can be found only in the southern part of the highland, where a contiguous belt of settlements meets us both along the Amur River. While the belt of settlements along the Amur River is certainly purely agricultural, industrial activity is to be encountered along the railroad in the area of the Bureya Mountain Range. In Bira 316 hard coal is mined /253/, iron ore lies west of Bira in Kimkan, and farther on in the vicinity of the railroad there are known to be supplies of magnesite, manganese, and fluorspar. Gold is also there and is extracted from the gold streams of the Sutar valley. This sourthern part of the Bureya Highland belongs to the Jewish Autonomous Oblast. It will be discussed in context in the following chapter.

/Sketch Map of the Jewish Autonomous Oblast/

The Amur Plain

B3 This region extends from the eastern slopes of the Bureya Mountain Range to the shore of the lower Amur, and it forms a vast lowland covered with meadow steppe. This lowland is scarely inferior to the Zeya-Bureya plain in the luxuriant growth of grass. The mean height of the plain is 45 meters. On the eastern side of the Bureya Mountain Range there run parallel to this range some mountain ridges, which go beyond the 1,000 meter mark only in the rarest of cases, such as in the Badzhal'skiy Mountain Range.

The Amur plain is regarded as a continuation of the Ussuri-Khanka depression and represents a graben zone, which is set between the Bureya Mountain Range on the west and the Sikhote-Alin' on the east.

The plain itself is divided into the flood area, which can be from a few kilometers up to 20 kilometers wide, and the real plain, which begins with a step. Only the edge of the plain is cut up by the rivers; otherwise the plain is for the most part completely flat and toward the mountains goes gradually over into a hilly landscape. The country on the right bank of the Amur below the mouth of the Ussuri is more varied in form /254/ because of the spurs of the Sikhote-Alin'. This area is generally higher, and its landscape is gently rolling to hilly.

Even though the external picture of this area recalls that of the Zeya-Bureya plain, the Amur plain, nevertheless, differs because of its greater swampiness, which goes back in the first place to the damper

3: Thiel--292 K-4,5(no date) 1953 RR1 Siberia RR1

Sketch Map of the Jewish Autonomous Oblast:

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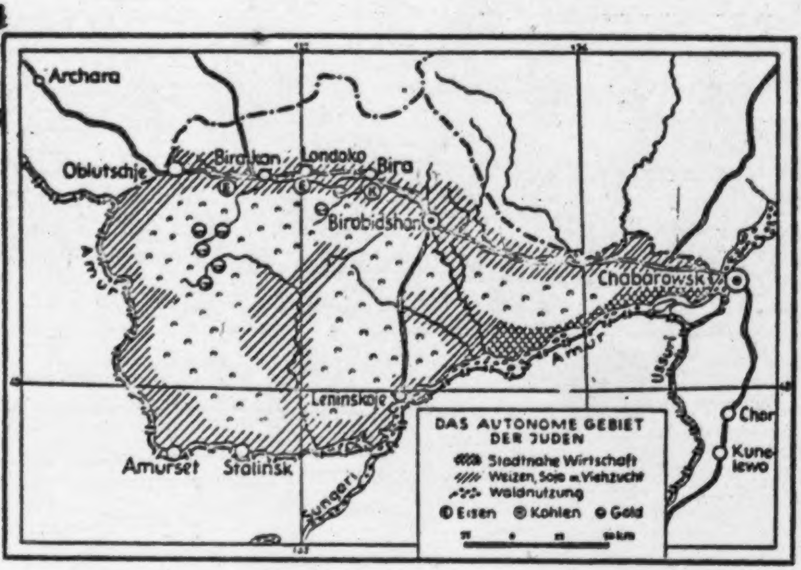
Archara
Oblutschje
Birakan
Londoko
Bira
Birobidshan
Amur
Chabarowsk
Amur
Ussuri
Leninskoje
Char
Kunelewo
Amurset
Stalinsk
Sungari
DAS AUTONOME GEBIET DER JUDEN
Stadtnahe Wirtschaft
Weizen, Soja u. Viehzucht
Waldnutzung
Eisen
Kohlen
Gold

▩ Economy in the Vicinity of a City
///// Wheat, soy beans, with livestock
⌒⌒⌒ Exploitation of the forests
Ⓔ Iron
Ⓚ Coal
● Gold

climate and then also to the great masses of water which flow together 133 here in the Amur, Sungari, and Ussuri. With the relatively low position of the plain these great masses of water permit the ground water to rise very high to the water level of the rivers. The swampiness is also fostered by the old sea deposits lying in the ground of the plain. These sea deposits mostly form a solid, impermeable layer of loam. In addition there is a further difference, which lies in the state of development of the landscape. In contrast to the thickly settled, cultivated landscape of the Zeya-Bureya plain, the Amur plain is occupied only in its southern part and here, too, only in strips--along the railroad and along the Amur. The largest part, especially the area below Khabarovsk, is only sporadically occupied by settlements, which here completely disappear in the vast natural landscape.

After the break through in the Bureya Mountain Range, where the Amur is in places compressed to a width of almost 500 meters, the river expands to a true lowland stream. The banks become low and move back, numerous islands, often of great length, occur and divide the river into very many arms. Normal widths of 2 to 5 kilometers are no longer a rarity. The Sungari, which the Amur takes in here from the right, comes far from the south of Manchuria and brings warmer water to the Amur; accordingly, the Amur below the mouth of the Sungari becomes free of ice earlier and also remains open longer. Forty-five kilometers above Khabarovsk and the real mouth of the Amur, the Amur receives the Kasakevichevsk River, the first arm of the Ussuri coming from the south.

The Khabarovsk plain spreads out opposite the mouth of the Sungari and the Ussuri. Thick layers of loam form the base here and, through their impermeability, cause the area's great inclination toward swampiness. As a consequence of this, the areas near the rivers are the least suitable for agriculture, which occurs first on the somewhat higher, better-drained land. In contrast to the Zeya-Bureya plain, therefore, vast areas here remain swampy meadow steppes in their natural state and are used as meadows or hay fields. However, dry ridges and mountain groups also appear in the middle of the Khabarovsk plain. These ridges and mountain groups consists of Paleozoic layers (carbon) and are covered with forests. Their absolute height often reaches 500 meters.

The entire area within the arc of the Amur from Pashkovo to the 64 mouth of the Ussuri belong to the Jewish Autonomous Oblast. Northern 131 border runs north of the railroad line. The oblast covers 36, 800 square

634 kilometers, and its population numbers /255/ 108,400 (1939), of which
131 approximately half are Jews. This region is drained by the Bira, whose
upper valley is also used by the railroad, and by the Bidzhan. Both of
these rivers run through broad valley meadows, which are covered with
cultivated fields. From the two rivers the region has also received the
361 name of "Birobidzhan," which is often used. The capital of this oblast
also bears the name of "Birobidzhan." Lying on the railroad at the
point where the railroad leaves the Bira, this city has around 30,000
[294] inhabitants (1939). Worthy of note is a large clothing and knitted goods
factory, which is the sole large installation of this type in the entire
135 Far Eastern region. The western part of the oblast, which has already
been mentioned in the discussion of the Bureya Highland, is rich in the
most varied natural resources, of which the coal deposits of Bira and
the iron ore of Kimkan are supposed to become the basis for the establishment
241 ment of a local heavy industry. The Jews are in all occupations, even
in agriculture. In the large section of the west the cultivation of wheat
and soybeans predominates; in the smaller eastern section, which is influenced
by the nearness of the large city of Khabarovsk, the cultivation
234 of potatoes and vegetables and the breeding of dairy livestock predominate.

361 Khabarovsk, which lies below the mouth of the Ussuri on the
right side of the Amur, is the administrative and economic center of
the entire Amur region. Its favorable location, in terms of transportation,
in the center of a mighty river system and at the end of the Amur and
Ussuri Railroad has permitted the city to grow very quickly into a large
[161] city. Having a population of only 52,045 in 1926, Khabarovsk almost
quadrupled its population by 1929 when it had 199,364 inhabitants,
and today its population has probably exceeded 300,000. This rapid
[39] growth in population goes back above all to the expansion and construction
of industrial plants. In the foreground is machine construction, especially
the construction of machinery for agricultural purposes, the processing
of metal and of wood, and a food industry which is brought together
in large plants. As the center of the Amur shipping, Khabarovsk has
a shipyard in which coastal vessels are also built. A modern cracking
[382] installation has been added to the older oil refinery in order to process
[508] the oil from Sakhalin. Khabarovsk is the center of all air traffic in
the Far East. Several airports are available, and, in addition, there
[241] are plants for the construction of airplanes and automobiles. In the
wide surroundings of the city there has developed an agricultural economy
which is typical of areas near cities and in which the cultivation of
vegetables and the breeding of dairy livestock predominate.

vegetables and the breeding of dairy livestock predominate.

Below Khabarovsk the Amur plain continues toward the north. Here the Amur first develops to its full size. At the city the height of the water level fluctuates between 23.97 meters and 40.20 meters (above sea level), and only a little below the city the river in places goes 10 to 20 kilometers beyond its normal borders when the water is high. In great windings, the river flows on, often making curves and loops of 10 kilometers and more where the direct route would take up only a fraction of that. Numerous old waters and arms follow the main stream. The Tunguska is formed by the two rivers, the Kur and Urmi, /256/ and flows into the Amur from the left. Until a short time ago its lower course was an arm of the Amur; the Tunguska, therefore, has the same river valley and, for the greatest part of its course, flows parallel to the Amur. When the water is high, the upper part of the Tunguska is connected directly with the Amur. Further down the elevations emerging there force the Amur into narrower paths. But again and again the Amur uses every imbedded plain to break up into numerous arms and to fill lake-like structures with its water. With the Kizi and Kada lakes the Amur comes within a few kilometers of the sea coast. Here the mouth of the Amur may once have been located, before an elevation of the ground cut off the exit and forced the masses of water to grope their way further toward the north through a mountainous-hilly country until, after taking in the Amugun, the water found its present way out. Kizi Lake, which is united with the Amur by a natural connecting canal, lies only 15 kilometers from the Tatar Strait and is separated from De-Kastri Bay only by low hilly country, whose greatest height is 155 meters. At this spot a canal from Mariinskoye on the Amur to De-Kastri Bay could shorten the path of the Amur to the sea by around 280 kilometers. This passage has been planned several times.

The Amur plain also continues in the same shape toward the north along the lower course of the river. However, the picture here is much more determined by the flowing waters and the imbedded lakes than in the Khabarovsk plain. In the vicinity of the river, however, the monotonous character is interrupted by elevations and depressions, which line the river. The elevations have the appearance of long extended hills and embankments and are often up to 10 kilometers long. They are old shore embankments, which mostly lie 14 to 16 meters above the normal level of the water and which, therefore, are no longer reached by the floods. These elevations are in part overgrown with

133 meadows on the river, otherwise they are covered with spotty clumps of grass. Where this grass is destroyed, the loose sand shows through, and the wind blows this together into dunes. The shores of the rivers are flat and predominantly covered with meadow, over which the
[311] high water extends. The old shore embankments are of greatest importance for human settlement; the broader ridges are as a rule plowed up and used for vegetable gardens, while the areas which become flooded serve as meadows or are used as hay fields. Now and again the entire plain is narrowed down by approaching mountains, or the plain widens to a great breadth with the neighboring depressions adjoining it. In such an area, in wide, swampy surroundings, lies the very flat Lake Bolon' which is 1,200 square kilometers and which is connected to the Amur by a broad water stream. The water level of the lake follows that of the Amur, and when the water is high even a backward flow is to be observed. At Komsomol'sk the hilly mountains come right down to the river on both sides and force the river into one continuous bed. Here ends the contiguous line of the real Amur plain with its magnificently flat relief, /257/ and an irregularly formed landscape begins. Nemerous rows of hills and chains of mountains with heights of up to 500 meters, indeed, even up to 900 meters, make the general picture more lively. The Amur again and again gains in area and widens often like a lake with numerous islands in the broad valley areas and forms in its neighborhood standing water in the form of long lakes in individual basins and old river beds. Despite this, the overall character of the far more broken up Amur plain is determined by the tributaries, which flow into the Amur from both sides in long, often curved, wide valley areas and which increase still more the degree of dividing up of the country. First to be mentioned in this connection is the valley of the Gorin, which extends into a broad depression in the hinterland and which conceals there the big
[135] Lake Evoron. Further down are the plains of the Limuri and Pilda; the area around the upper course of these rivers is known for its gold sands.
133 Finally there is the extended valley of the Amgun which is more than
137 800 kilometers long. The general landscape picture changes its face but little toward the north. Meadow steppes, overgrown with high grasses, are also still typical here, even though the ground becomes ever damper toward the north and the swampiness increases. The same applies also to the appearance of broad-leaved deciduous trees within the forested areas; these forests represent characteristic mixed forests on the lower hills and mountains. In the direction of the

Bureya Mountain Range the deciduous trees disappear as the height increases, 133
and on the mountain range itself and in the Bureya Highland 137
Siberian taiga with Okhotsk strains penetrates generally far toward
the south. In the Amur region itself the moderating influence from
the south ends with the closed off plain, the climatic conditions become
more unfavorable, cooler, and damper; the Sea of Okhotsk
dominates here. The meadow steppes change into treeless moss swamps;
coniferous forests of an Okhotsk stamp cover the hills, on which here
and there the first appearances of high moor formations can be determined.
These are signs, which are typical of the northern coastal
mountain landscapes. This region already is reckoned as being such a
landscape, and it is for this reason that this area along with the drainage
area of the Uda will be treated as an independent region.

In the Khabarovsk region the Amur plain is settled over a large 361
area. Wheat, barley, and rye are cultivated here still with good
harvests, but toward the north potatoes and vegetables take up an increasing [241]
percentage of the land cultivated, since the yield of the grain
harvests becomes inferior as a consequence of the dampness of the
ground. With sufficient drainage, wide areas could still be won here
for the cultivation of grain. Instead the excellent natural meadows
serve for breeding of livestock. Toward the north the density of the
population decreases rapidly, and approximately from the Mukhen, a
right tributary on, settlement is limited to the river banks on which
small villages or individual settlements of Russians or natives are to be
encountered at a distance of 10 to 20 kilometers from one another.
The settlements for the most part lie on the right bank of the Amur,
which is the higher bank. The /258/ left side with its unpredictable
high waters is too dangerous for man. In favorable spots larger localities
have also developed, such as Troitskoye with its approximately 4,000
inhabitants. In general the settlements are small. The Russian villages 361
can be recognized by their wooden houses. The Gilyak, Goldi, and 563
also here and there Chinese and Koreans, on the other hand, in many
cases still occupy mud huts, which are built on the pattern of the
Chinese fang-tze. Along with the population, agriculture decreases
toward the north. Fishing comes more and more into the foreground, [226]
until it becomes the principal occupation on the lower Amur. Here
again settlements pile up. According to the state organization of the
catching of fish, these settlements are specialized for this trade, and
they have heavy immigration. Thus the population grows quickly here,
but it is dependent on imports for supplies. All the other areas which

361/563 lie at a distance from the Amur are as good as uninhabited and in
many cases are also unknown. Besides the Goldi and Gilyak, who,
being fishing peoples, live in fixed dwellings primarily on the Amur
and its tributaries, there are reindeer-breeding Samaghir who traverse
the region of the Gorin, and the Negidal of the Amgun region, who
are smaller in number. The Olcha are diffused on the right side of
[135] the Amur. Findings of gold, which have been made on almost all the
left tributaries of the lower course of the Amur, have given some
spurs to settlement in very recent times. The rivers on which gold
has been found are the Limuri, Pilda, Bichi, and it has also been
found in Orel Lake as well as on the lower course of the Amgun.

The most important localities on the lower course of the Amur
361 are Komsomol'sk and Nikolayevsk. Komsomol'sk lies alone in a vast,
unoccupied region of the left bank of the Amur. The city arose only
after 1926 from the small fishing village of Perskoye; it was the
creation of the Communist youth (Komsomol), from which it has received
[161] its name. By 1939 it already numbered 70,000 inhabitants,
and today its population is estimated to be more than 150,000. The
[396] city has a large river harbor with an important shipyard in which sea-going
[327] ships are also built. The largest undertaking is the steel and
rolling mill, "Amur Steel," which is supposed to have been expanded
to an annual capacity of 500,000 tons of crude iron through the construction
[382] of three blast furnaces. The already existing oil refinery
has been enlarged by the addition of a cracking installation. A second
[377] heat power plant is under construction, and a large water power plant
was completed some time ago to supply the city with electricity. In
addition, the city houses around twenty additional industrial undertakings
and promises to become the economic center of the entire
361/496 area around the lower Amur. Already several years ago the city was
connected with the Amur Railroad west of Khabarovsk by a railroad
line, which begins in Volochayevka. In order to counteract the difficulties
of building a railroad in the damp Amur plain, the railroad
was laid on the western edge of the plain and also goes around Lake
Bolon' in the west. With this course, new dry areas were opened up
to agriculture, and at the same time the rich supplies of wood in the
forests /259/ have been brought closer to exploitation. Of greatest
significance, however, is the fact that Komsomol'sk is the end of the
BAM. By using this railroad the vast areas of the northern Amur
country have in Komsomol'sk their nearest exit to the sea. However,
the natural unfavorability of the mouth of the Amur has led to a

lengthening of the BAM via the Sikhote-Alin' to Sovyetskaya Gavan', 361 which is the best natural harbor on the coast of the Gulf of Tatar. 496 The railroad for a part of the way uses the middle course of the Khungari, a right tributary of the Amur, in whose basin a large Tertiary brown coal deposit was discovered in 1932. This deposit is supposed [735] to be used to run the railroad. At present the railroad to Sovyetskaya Gavan' already plays an important role in the treating of lumber from [313] the Sikhote-Alin', which is processed for export in a large lumber mill in the harbor city.

Nikolayevsk with its approximately 30,000 inhabitants is the 361 economic center in the region around the mouth of the Amur. It owes its importance above all to the wealth of fish in the neighboring parts of the sea and in the Amur. Accordingly, it has been able to develop [228] into one of the largest centers of the fish-processing industry. The [505] city cannot develop very well as a sea harbor because of the harsh climatic conditions--the ice-free period lasts only around 160 days--and the unfavorability of the mouth. The mouth of the river is closed off by a sand bar of great width, which enables only those ships to pass which have a draught of up to 3.50 meters. In addition, there is the fact that the "Amur-Liman" itself is very flat, has many shallows, and thus permits sea-going ships to travel on it only in a few natural canals. Thus only smaller coastal vessels can get into the Amur, while larger sea-going ships must be unloaded on the open sea and their goods transferred to river vessels. For many years they have been in the process of creating a suitable waterway in the Amur, but the difficulties appear to be too great. Above all the natural deposit of bar sand again and again destroys the work of man.

The Sikhote-Alin'

The Sikhote-Alin' with its mountains fills the entire area from 133 the mouth of the Amur on the north to the steep break at the Bay of Peter the Great. In contrast to this vast expanse, the narrow depression which extends at the western foot of the Sikhote-Alin' and which only in the south has extensive plains, appears to be of subordinate importance, particularly, too, because spurs of the Sikhote-Alin' not uncommonly penetrate almost to the Ussuri, and individual mountains of the Sikhote-Alin's border steps which traverse the entire land, appear even in the plain. Nevertheless, the smaller depression has the greater significance, for in it sits the bulk of the population, and in it

133 lie the main fields for producing food in the entire Ussuri country. Thus we can contrast the natural landscape of the Sikhote-Alin', which for the most part is still untouched, with the cultivated landscape of the Ussuri-Khanka depression.

/260/ The Sikhote-Alin' belongs to the more recent peripheral formations of the Asiatic continent and represents the elevated eastern edge of a sunken land step. It lies between the Sea of Japan and the Tatar Strait, on the one side, and the depressions of the Khanka Lake, of the Ussuri, and of the lower Amur, on the other side. The Sikhote-Alin' consists of a series of up to eight parallel mountain ridges which stretch toward the north-northeast. The mean height ranges between 700 and 1,000 meters. In the northern section individual heights reach up to 1,300 meters, in the area around the sources of the Bikin and the Iman some mountains project 1,500 meters, and in the south in the area around the upper course of the Ulukhe the highest elevation to date has been measured as 1,845 meters. According to a recent publication (Suslov), the highest mountain has been determined now to be the Golets Komarov in the area around the source of the Koppi. This mountain has a height of 1,940 meters.

The watershed between the Ussuri and the ocean is strongly inclined toward the latter. In this the watershed chains are not always the highest. The area around the source of the Ussuri and also that of its largest tributaries, the Iman and the Bikin, lie not far from the coast. In the central and northern section the conditions are much more complicated. There is no mountain range which is the bearer of the watershed; rather the watershed changes constantly and irregularly from one ridge to another. Often it occurs that rivers which flow into the sea or into the Ussuri-Amur have their origin on the opposite side of a mountain chain, move first in the direction of the long axis of the Sikhote-Alin', then reach the next valley through a breach until--often after several cross passages--they decide on a final exit from the system of the mountain range. Decisive for the peculiar course of the rivers is not only the relief but also the rock. Both are the cause of the broken lines of the courses of the rivers, which are characteristic of all of the Sikhote-Alin'. Accordingly, the rivers also often change their character. Following a quiet course are breaches, gorge-like valleys, waterfalls, river rapids, and then shortly thereafter the river will again flow quietly and calmly for a while. Thus there is generally a very unequal and irregular hydrographical picture.

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The entire interior is taken up by contiguous mountain massifs, which extend without interruption as far as the ocean, where they break off at the coast with steep rock steps. The heavy weathering effects of the raw and damp climate and far-reaching powers of erosion of the rivers, which are short but flow down to the coast with great drops and whose erosion basis has changed several times because of vertical movements, have so heavily cut up and changed the ridges near the coast that from the sea these appear to be a high mountain range. The interior itself, however, is monotonous. If one looks out from one of the higher mountains, approximately in the sphere of the watershed chains, the eye encounters a vast series of more or less long chains, stretching predominantly in a north-northeasterly direction. /261/ These chains consist of an almost unending series of accumulations of lower peaks which rarely appear bare and mostly are covered with thick forests. Nowhere is the climatic snow border reached. Where snow lasts until August, indeed, even until September, it occurs in the protection of depressions under the crown roof /Kronendach/ of the taiga. Often, however, the regularity of the mountain chains disappears. Cross-bars connect the individual parts, which stretch toward all four points of the compass. The landscape, however, has a different face where, as in the environs of the Soviet Harbor (Sovyetskaya Gavan') or in the central region on the upper Bikin, basalt and other eruptive elements have poured forth and with their effusions have formed almost level surface forms which often cover many square kilometers. Here the valleys are deeply etched like canyons. The walls decline steeply, often in steps. The high plains break off suddenly, so that, when one is on a high plain, one can for some distance overlook a narrow valley until one unexpectedly stands on the edge, from which the steep wall forms a sharp decline, descending not uncommonly a hundred meters and more. But in the other sections steep projections are also not lacking since the rise to the passes and high plains is mostly very difficult, less so from the west but very difficult from the coast.

Generally striking are the forms of destruction, in which the effects of the monsoon climate are demonstrated. These effects are especially prominent in the south. The effects of the monsoon climate are expressed particularly in the formation of the cone-shaped mountains, which are very numerous in the Sikhote-Alin'. Mostly, however, the mountains are cores such as we find on the Murayev-Amurkiy Peninsula where the cores consist of porphyry and its tuffs and project as individual

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mountains from the Lower Jurassic sediments. The heavy effects of erosion have been furthered by the rapacious deforestation in the past, which has denuded of forests all sections of the mountain range in the vicinity of the cultivated zone. Also the typhoon-like storms which rage over the southern part of the Sikhote-Alin' every year and often destroy the wood supplies of whole areas, contribute to the fact that the floods of rain can attack the slopes more easily, and thus the dissolution of the forms increases. Worthy of note are the great boulder slopes and stone slopes. Many may well represent prehistorical forms and may stem from earlier climatic periods of a different type from today's, but their formation is also essentially determined by the heavy erosion and the great dampness of the present-day monsoon climate. Often, in the regions around the upper courses of rivers, valleys are to be observed which are torn out as narrow, deep gorges and which have steep slopes which are fully covered with stone heaps. Often a footstep is enough to cause these stone heaps to precipitate down into the valley. Many valleys are notorious for their falling stones and their landslides, and not uncommonly it occurs that narrow gorges are entirely filled up with stones and broken wood. In the regions around the upper courses of the rivers, therefore, the springs and brooks very frequently flow invisibly under rock ruins and come to the surface only after a rather long course in order then to dig themselves a bed.

The forms of the valleys change greatly and show all stages of their development /262/ from narrow gorges to flat valleys which are kilometers wide. Only glacial forms are lacking, for the Sikhote-Alin' was not glaciated. Since the basalt effusions are more recent than many of the old valleys, many of them were dammed up by the basalt streams and then again broken through. Because of the elevation and the retrogressive erosion, sloping valleys and graded river mouths /Stufenmündungen/ are frequent phenomena. The main valleys are disproportionately wide and in their erosion may not keep pace with the recent elevation. Therefore, the lower courses of the rivers as a rule also have sharp drops, often sharper than in the upper courses. Others are extensively heaped up and swampy. This is also a consequence of the very irregular passage of the water, which results from the monsoon climate. The main water veins cannot contain the quantities of water flowing together from hundreds of tributaries during the rainy period, and these main water veins then overflow the entire valley area with great pressure and can become a catastrophe for the

133 people there. All settlements on the lower courses of the rivers coming from the Sikhote-Alin' suffer in such floods. The harsh continental winter brings the appearance of frost such as is usual in Siberia. The water which is pressed out from rivers through the ice-covering, freezes again and again and makes formations of ice on top of ice, which can become kilometers long. If the water flows under pebble slopes, then the rock fragments are covered with concentric layers of ice, which are up to 10 centimeters thick. The boulders and pebbles then are entirely frozen in, but when the thawing weather comes, they fall into all the heavier movement (Arsenyev).

Despite the fact that the forms vary greatly in detail, the large, round, equalized lines of the mountain range nevertheless remain predominant in the overall impression.

137 The general forest covering contributes to this. Despite the careless cutting down of trees in the border regions, this forest covering with its wealth of wood, especially of valuable deciduous trees, represents a still unexploited treasure of the Sikhote-Alin'. But the forest is not of the same quality everywhere. The great dampness hinders growth especially on the coast, where the trees are often crippled and covered with knots. The underwood is then all the thicker, and the natural wilderness is all the more difficult to penetrate. In the interior the forests become swampy easily, and even on the watersheds marshes form.

133 The picture of the present-day coast owes its origin to the old forms of a heavily cut-up landscape submerged under the sea. Striking is the difference between the marked ria coast on the south and the more compensating coast on the east which has only a few bays. The causes of this morphological phenomenon have been investigated in great detail by Romer (168) and Nowak (134). They show first that

168. Romer, E. Bericht über geographischen Arbeiten im Gebiete des Sichota-Alin-Gebirges. /Report on the Geographical Works in the Area of the Sikhote-Alin' Range/ Anzeiger de Akademie der Wissenschaft Krakow, /Review of the Academy of Science in Krakow/ Series A. Krakow, 1913.

134. Nowak, J. Wissenchaftliche Ergebnisse der Expedition nach dem Sichota-Alin. /Scientific Results of the Expedition to the Sikhote-Alin'/ Krakow, 1913.

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the explanation of the older Russian scientists, according to which the strips of the layers and tectonic disturbances alone are the causes, is not tenable. In addition to a varying resistance /263/ capacity on the part of the rock (Romer), the different angle of inclination of the submerged land above all is made responsible for this phenomenon. The line where the water is 200 meters deep runs at a distance of 15 to 25 kilometers from the east coast, but on the south coast, west of Cape Povorotnyy, this line lies at a distance of 125 kilometers from the coast. The average drop on the east coast is 8 to 13 percent and exceeds by more than fivefold the drop on the south coast which is 1.6 percent. With the same power of the surf, therefore, the former ria coast on the east is completely destroyed, leaving only the slight remains of today, while the southern coast has been able to preserve itself. The varying strip direction, therefore, has only a subsidiary role, the essential reason being the varying submergence of a heavily divided landscape. This submergence occurred before the effusion of the lava coverings. The elevated basalt lava in the vicinity of the coastal locality of Sovyetskaya Gavan' is covered with sea deposits. The elevation here is very young.

Recent post-Quarternary vertical movements play the principal role in the creation of the coastal forms in detail, especially in the creation of the valley forms through the displacement of the basis of erosion. These post-Quarternary vertical movements are characteristic of a great part of the east Asiatic coast. These movements are indicated by beach stones, terraces, surf channels, old shore embankments, and layers with recent mussels at the most varied heights. According to the research of Dunikowskij (57) and Romer, there are

57. Dunikowskij, E. H. "Stratigraphische Geologie des Sichota-Alin" /Stratigraphical Geology of the Sikhote-Alin'/, Wissenchaftliche Ergebnisse der Expedition nach dem Sichota-Alin /Scientific Results of the Expedition to the Sikhote-Alin'/. Krakow, 1913.

five phases of these movements: 1. elevation of over 200 meters above the present surface of the sea; 2. lowering by 500 meters; 3. elevation by 150 to 200 meters; 4. elevation by 100 to 150 meters; 5. very recent lowering. The last phase of the lowering, however, touched only the extreme southern coast. Even at present this lowering has still not been concluded. On the east coast, on the

other hand, an elevation still appears to hold sway at present. Many 133
rivers emptying into the sea show delta formations.

As a consequence of the southern current running along the coast, numerous narrow tongues of land separating small bays from the sea have formed. All these tongues of land point toward the south. The deltas mostly lie left of the river courses, which, therefore, show a wandering to the right and which also dig under the shore on the right side. The sea current is weaker and irregular on the southern coast, which is heavily broken up; thus tongues of land here can run in all directions.

The most important bay on the east coast is Ol'ga Bay. It was discovered in 1787 by La Perouse and forms one of the best natural harbors on the coast. Lying off the bay are the small, rocky Chikhachev Islands. The bay itself has a diameter of 3 kilometers and is on the mean 25 meters deep. Once it was at least three times as large and reached much more deeply into the land toward the west. Today the valley areas of the rivers emptying into the bay become swampy. When there is a strong east wind, a backward flow can even be determined. The old marine abrasion terraces are very well preserved on the mountains at a height of 25, 30, and 120 meters. The low mountains surrounding the bay consist of granite, quartz porphyry, and sedimentary rock and contain above all iron /264/ in addition to lead [135]
ore containing copper and silver. This iron is magnetite with an iron content of 50 percent; the iron is being mined here. The harbor locality of Ol'ga has several thousand inhabitants. In the hinterland of the bay [361]
Russian peasant settlers have made their appearance.

The Tetyuke Bay has a greater economic importance. Here, 316
35 kilometers from the coast, is the most important zinc-lead-silver 504
ore in the Far East. A narrow-gauge railroad connects the mining installations and the preparatory installations with the harbor, which has gotten modern loading equipment very recently. The harbor locality has several thousand inhabitants. Here, too, there are agricultural settlements in the hinterland.

Between the two above-mentioned bays is a third bay, the 133
Vladimir Bay. It is surrounded on all sides by granite mountains which are up to 225 meters high. The bay has a depth of up to 12 meters. Fresh water lakes and swamps enable us to recognize the former larger expanse of the bay. Two projecting rocky peninsulas enclose the bay. Vladimir is known for its installations for the extraction of iodine from seaweed.

133 Of the more favorable bays on the northern part of the Sikhote-
361 Alin' coast, only the bay is still to be mentioned on which the already-
mentioned harbor of Sovyetskaya Gavan' lies. The natural bay, which
is suitable as a landing place, has a vast, flat hinterland, which also
has a rather thick agrarian population. Since the completion of the
railroad constructed from Komsomol'sk to here, the locality has
[504] developed quickly into a city with more than 20,000 inhabitants. It has
also received a modern harbor. The processing of wood stands at the
[396] center of the economy, but, in addition, ship construction is also
pursued. The harbor has a floating dock for ships with up to 5,000 gross
registered tons.

361 For the rest there are in addition numerous small Russian fishing
localities on the coast. These mostly lie at the mouths of rivers, and
[505] now, through the bringing together and the building up of the fishing
industry, these localities are also experiencing a certain upsurge. The
supplying of the localities is done by coastal steamer. Only where
wider bays and more extensive valley areas have given the opportunity,
have Russian settlers also made their appearance here. These settlers
have in places already penetrated 50 kilometers and more into the
land.

133 The real, vast mountain massif of the Sikhote-Alin' is very
sparsely populated; indeed, large sections are uninhabited. In the
361 pathless interior on the upper course of the Bikin and of the Khor, on
the Mukhen, Anyu, and upper Khungari, the Tungus Orochi and Olcha
are still to be encountered. They wander as nomads with their pointed
tents and live exclusively from hunting and fishing. But their number
becomes ever smaller. Otherwise only a few Russians and Chinese
traverse the wilderness of the lonely valleys and mountains while hunting
for fur-bearing animals and the antlers of Isiubr stag. The opportunities
for agriculture and the breeding of livestock are slight. Only the
broad bottom valleys of the main rivers are suitable for this; here,
from the valley of the Ussuri on, Russian settlers are in the process
of a slow penetration into the interior, especially on the Khor, Bikin,
and Iman, in whose valleys /265/ they can already be found far in
among the mountains. It cannot be said how much the collectivization
of agriculture has contributed here to a further opening-up of the land
or whether a perseverence on the land already won is the consequence
of these measure.

137 Greater prospects for human activity are offered by the natural
resources. Despite the careless cutting down of trees in the border

regions, the Sikhote-Alin' can still, as always, be designated as rich 137
in forests. Planned exploitation of these forests has still not been begun at all. Of still greater significance for the future are the vastly 135
rich resources of the ground. The southeastern part of the Sikhote-Alin' appears to be a true mine for the latter. However, a large part of these supplies has still not been once sufficiently investigated. The prospects for development along mining and industrial lines are always completely favorable, only an opening up in terms of transportation must pave the paths to the sources.

The extreme southern part of the Sikhote-Alin' is generally 361
relatively thickly populated, and it is also better opened up from Vladivostok on. It already belongs more to the cultivated zone, and economically, too, it is so closely connected with the cultivated zone that it will be treated in connection with the Ussuri-Khanka depression.

The Ussuri-Khanka Depression

The western foot of the Sikhote-Alin' is, for its entire length, 133
accompanied by an extensive depression, which stretches from the Gulf of Peter the Great to the mouth of the Amur, thus covering more than 1,300 kilometers. The Ussuri-Khanka depression forms the larger, southern part of this long depression and has a total length of 700 kilometers from the southern end to the mouth of the Ussuri. As compared with the Sikhote-Alin', this depression represents the sunken part of the land step and is accompanined on the west by the step, again elevated, of the east Manchurian mountain range. In the Tertiary period, the entire depression, as Ivanov (83) assumes, was flooded by the sea, and thus the Sikhote-Alin' projected from the sea as a long, narrow island. Proof of this view has been attained up to now only for the southern part of the depression.

The bulk of the depression belongs to the drainage area of the Ussuri. A flat watershed, which is scarcely perceptible in the countryside and which has an absolute height of only 190 meters above sea level, separates this section of the depression from that section of the depression whose waters drain off toward the south, i.e., the river

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83. Ivanov, D.V. The Sikhote-Alin' Ridge /in Russian/. Petersurg, 1896.

133 area of the Suyfun.

The Usssri comes from the southern part of the Sikhote-Alin' and arises from two source rivers: Daubikhe and Ulakhe. It flows first entirely in Russian territory, and, at the mouth of the Sungacha, which comes from Khanka Lake, it reaches the Manchurian border from where it then serves as the border river until it empties into the Amur. On the mean it is more than 420 meters wide in the lowland and flows languidly in a winding course with a mean velocity of only 1.5 kilometers per hour. The lower course of the Ussuri is often divided into several arms and becomes more than 1 kilometer /266/ wide. Numerous shallows hamper shipping, but the Ussuri is regularly traveled as far as Iman, where the steamer landing place is connected with the Ussuri Railroad by a railroad branch which is 1.5 kilometers long. Under favorable water conditions the Daubikhe is even traveled for a length of 100 kilometers as far as the locality of Lazarevo. However, the flow of water is generally very irregular, and also the summer high water changes greatly. Fluctuations in the water level occur, in which there is a difference of 10 meters between the extremes. Larger downpours of rain often cause the river to rise very rapidly, and thus unforeseen floods occur and cause much damage. The figures of Berg (27) show what great quantities of water can come down in such violent downpours of rain as are usual during the summer [132] monsoon. While in Voroshilov, the former Nikol'sk-Ussuriskiy, the normal mean rainfall for September is 105 millimeters, a single, mighty downpour of rain in one day brought the rainfall for that September to 115 millimeters. On August 9-10, 1927 in the same place 122 millimeters of rain fell within 22 hours during a cloudburst, which was connected with a typhoon-like storm.

The Ussuri depression extends on both sides of the entire course of the river, and in the north the depression melts into the Amur plain. The Manchurian side appears in this respect to be disfavored in comparison with the Russian side. The Manchurian side lies lower, and its swampiness extends over a much greater area than that of the east side. But here, too, a zone, which is exposed to floods, which is very swampy, and which is little suited to agriculture extends along

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27. Berg, L. S. Landshaftno-geograficheskiie Sony SSSR /The Landscape-Geographical Zones of the USSR/, Part I. Moscow, 1931.

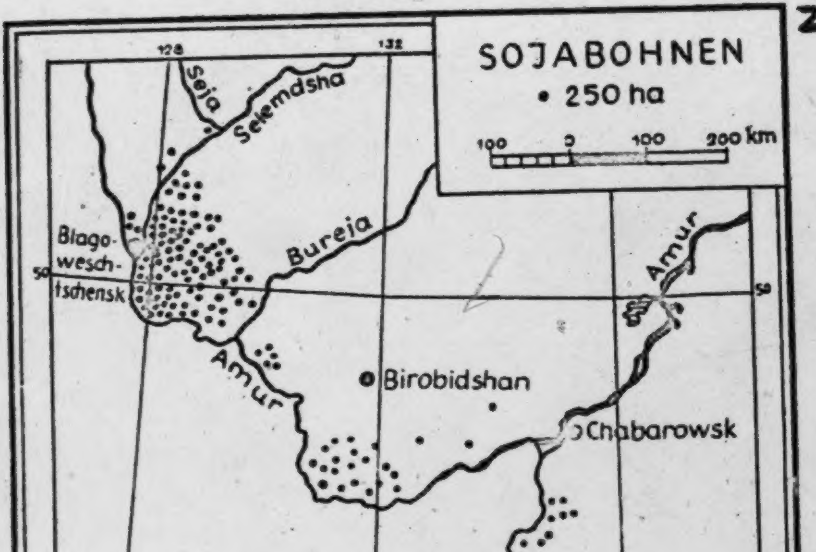
the river. However, in contrast to the western side, the eastern side is narrow, and only somewhat wider at the mouths of the tributaries. On the other hand, the depression is also completely lacking in places, i.e., where the spurs of the Sikhote-Alin' go right down to the river. However, not only do these spurs interrupt the depressions, but they also often interrupt the hills and ridges which emerge from the flat alluvial plain and which are drier and as a rule have cultivated fields, villages, and forests. Therefore, there are only a few settlements [361] along the river in the areas threatened by water. The real cultivated zone, which begins in the north already at Khabarovsk, always extends, for this reason, at some distance from the river bank along the country lying higher. The Ussuri Railroad also follows the higher land. Here [311] the forest landscape and the forest steppe landscape have been cleared over an area 100 kilometers wide and have had to make way for the cultivated land, which extends in a considerable width especially in the regions around the lower courses of the Khor, Bikin, and Iman. The most important localities in these three depressions are Kondratyevka on the Khor, Bikin, and Iman, all three of which lie at the point where [361] the above-mentioned rivers are crossed by the railroad. In the south the Ussuri depression flows together with the agriculturally important Khanka depression.

Khanka Lake lies 69 meters high and is 23,000 square kilometers in area, with its greatest length being 80 kilometers and its width being 40 to 85 kilometers. A narrow, sandy tongue of land in the north separates it from the so-called Little Khanka Lake. /267/ /Sketch Map//268/ South of this tongue of land the border crosses the lake, giving approximately a fourth of the lake to Manchuria. In the east the Sungacha forms the border. Khanka Lake is generally extremely flat, its greatest depth being 10 meters. It is surrounded by vast swamps and moors covered with reeds, and it is very much in the process of being filled up with sand. The western shores are formed from Tertiary loam and are, therefore, hilly and irregularly formed with numerous bays and peninsulas. Here to the west of the lake lie the regions, which, of all the areas near the lake, are most favorable for agriculture. The flat moors and swamps which otherwise surround the lake extend to the north for 10 kilometers, and toward the east and south they even extend 30 kilometers from the lake, thus indicating the one-time size and position of the lake. Where the swamps surrounding the lake are becoming somewhat drier, they are turning into meadows with high grass, thus giving a similar appearance to that of the Amur prairies of the Zeya and Bureya.

3: Thiel--310K-4,5(no date) 1953 RR1 Siberia RR1

Sketch Map

244


SOJABOHNEN
• 250 ha
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Seja
Selemdsha
Bureia
Blago-wesch-tschensk
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Amur
Birobidshan
Chabarowsk
Ussuri
MANDSCHUREI
46
Wladiwostok
JAP. MEER
128
132
136

● Cultivation of Soya bean Plants

/267/

000 134 the Zeya and Bureya. Also the soil both in the Ussuri depression and
also in the Khanka lowland is similar to that of the Amur prairies.
Here, too, it is not black earth, as is still often reported; rather there
is in the main muddy moor soil in the vicinity of the lake; this in
turn is surrounded by a broad zone of semi-marshy meadow soil, and
following then is weak podsol earth. The last two zones are cultivated
almost everywhere, and the soil there can in every respect compare
with black earth in terms of its yield. The zone of settlements,
[361] therefore, begins to the east and southeast of Khanka Lake but at
132 some distance from the lake. If here, as in the Ussuri region, agri-
241 culture has to struggle with difficulties, the reason for this does not
lie in the soil but rather in the climatic conditions, above all in the
heavy summer rainfall. The winter is very cold and brings only a
very thin covering of snow, and thus the ground freezes to great depths.
Berg (27) states that at Voroshilov the ground freezes to a depth of up
to 1.8 meters and at Grodekovo the frost even penetrates to depths of
241 up to 2.4 meters. The planting of winter grain is, therefore, not
advisable, nor is the planting of clover and lucerne advisable. The cultivation of winter crops is, therefore, always a risk. Further toward the south, in the Suyfun depression, winter rye is cultivated without danger. As a consequence of the deep penetration of the frost, the ground thaws out only late in the year. There is, however, no permafrost in the entire Ussuri region. The planting of summer wheat begins in mid-April to May, and the harvest begins in mid-August. Oats are sowed two weeks later, but are harvested at the same time as the wheat. The sowing of millet is done still later; the harvest, however, occurs only in the middle of September. The shortness of the time between the sowing and the maturity indicates the generally favorable conditions for the flourishing of the vegetation. The European types of grain suffer now under the dryness and under the strong winds during the sowing period, while during the summer they suffer from the great dampness, which makes fructification in the blooming period uncertain when it rains and which also endangers the maturing at harvest. All the better do the native cultivated plants /269/ flourish. With appropriate methods of cultivation European

27. Berg, L.S., Landshaftno-geograficheskie Zony SSSR /The Landscape-Geographical Zones of the USSR/, (Moscow, 1931), Part I, 1. 372.

cultivated plants also flourish with great success. Very recently new 241 sowing and cultivation machines have been employed by the Soviet in the entire Far Eastern region, which is damp in the summer. These machines take account of all the conditions of that area. In the expansion of the cultivated areas devoted to soy beans, rice, beans, millet, etc., it has been shown that there has been more conversion to these in more recent times, following natural conditions. The [242] noxious fungus, which prefers to attack the European types of grain, such as wheat, barley, and oats, has already been pointed out. This grain disease occurs in those damp warm regions in especially rainy years. As Arved Schultz (181) has observed, it is very characteristic that the fields of the Korean and Chinese peasants are attacked less than the fields of the Russians. There must, therefore, also be some reasons for this. In addition the fight against the Fusorien, of which a total of 22 types have been determined to date, has been taken up by the Soviet.

In contrast to the little populated eastern and southern sides 133 of Khanka Lake, the Tertiary hilly country to the west of the lake is thickly populated and is among the best agricultural regions. A rail- [496] road line, which is 127 kilometers long, leads from the Ussuri Railroad into this region and ends right on the border in Turiy Rog at the north-eastern end of the lake. On the eastern side of Khanka Lake, the cultivated zone, which continues from the north without interruption, 311 follows the Ussuri Railroad in a broad line, and with broad spurs into the valley of the Daubikhe and Ulakhe, the cultivated zone also penetrates toward the east into the mountain range. South of the lake the cultivated zone takes up the entire area from the Manchurian border to the mountain spurs of the Sikhote-Alin' and extends in an area of almost equal width via the Suyfun depression toward the south to the coast, where on the west side of the Bay of Peter the Great it extends farthest to the south in the coastal plain.

The watershed between the Ussuri and the Suyfun is flat and 133 scarcely makes an appearance morphologically. The Suyfun itself comes from Manchuria and crosses the border almost exactly at 44° latitude. Then it turns immediately toward the south to the sea. The valley area of the river is level and is accompanied on both sides

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181. Schultz, A. Das Ussuri-Land /The Ussuri Country/. Königsberg, Prussia, 1932.

133 by a peaked series of hills, which are 50 to 100 meters high. However, individual hills all appear on the floor of the valley, from which they rise with very steep walls. Adjoining this area to the east is a gently rolling and irregular Tertiary hill country, which acts as a transition to the spurs of the Sikhote-Alin'. South of Khanka Lake and also in [137] the Suyfun depression numerous small oak forests have been preserved which give the picture of the landscape a varied and attractive impression. As a consequence of the good drainage the best agricultural land in the area is to be found in the Suyfun depression. But also in the Tertiary hill country agriculture is making good progress. Here are the /270/ most thickly populated sections of the Maritime Krai, in which, however, the entire region near the coast of the Bay of Peter the Great must be included.

563 342 241 Great Russians above all are settling in the Ussuri depression. Their weathered, colorless log houses which are built of wood, are typical of the settlements in this area. Striking, however, in contrast to their homeland are the relatively flat roofs, which probably indicate the slight covering of snow which they have to bear here. Wheat, oats, and barley predominate in the appearance of their fields, but, in addition to corn, native plants, such as soy beans and perilla, are also appearing more and more. Ukrainians are the predominant settlers in the Khanka depression. As has already been indicated, this is based on historical reasons, since people from the Don above all were used in setting up the Ussuri Cossack formation of 1862. But it is still remarkable that it is Ukrainians who are in the majority in this almost treeless province. The bright color of their whitewashed mud houses dominates the settlements, and between the wheat fields corn comes strongly into the foreground. The Ukrainians here have also taken over for themselves the cultivation of sugar beets, just as they have in their homeland back in Europe. But, in addition, the yellow of the mud huts of the Chinese and Koreans also appears already in the individual settlements and in the village communities. These huts are often enclosed by the same mud walls; and in the flat, dammed-up fields there appears the light green of rice plantings, which are predominant in the damp area to the south of Khanka Lake. Further in the south toward the coast there is no longer a clear separation, but along the coast the Koreans increase. They often dress like Russians, but still they are more often dressed in the traditional white of the native clothing.

The breeding of livestock is pursued in the entire area: cows,

The breeding of livestock is pursued in the entire area: cows, 563
horses, and pigs are kept in the main. Ukrainians, Koreans, and 231
Chinese use the ox also as a work animal in the field; the Great
Russians, however, do not. Everywhere there is the slender, black
Chinese pig, which is of little value. Modern, planned breeding of
livestock became possible only after the introduction of valuable
breeds by the Soviets in the kolkhoz and sovkhoz.

Under Soviet rule greater improvement work has been carried 241
out in the region of the Ussuri and of Khanka Lake, and further draining
is planned. Many things have occurred for the further development
of the area through the employment of machines in agriculture, for
which these regions are especially suited. The cultivation of rice,
soy beans, and sugar beets has been especially fostered in the last few
years. The cultivation of sugar beets was introduced here as a new
cultivated plant only under Soviet rule. Nothing can be said about
the collectivization, which was carried out later in the Far East than
in the European part of the Soviet Union and which was carried out
only gradually. Nor can anything be said about the type of organization
in this area filled with men of the most varying types.

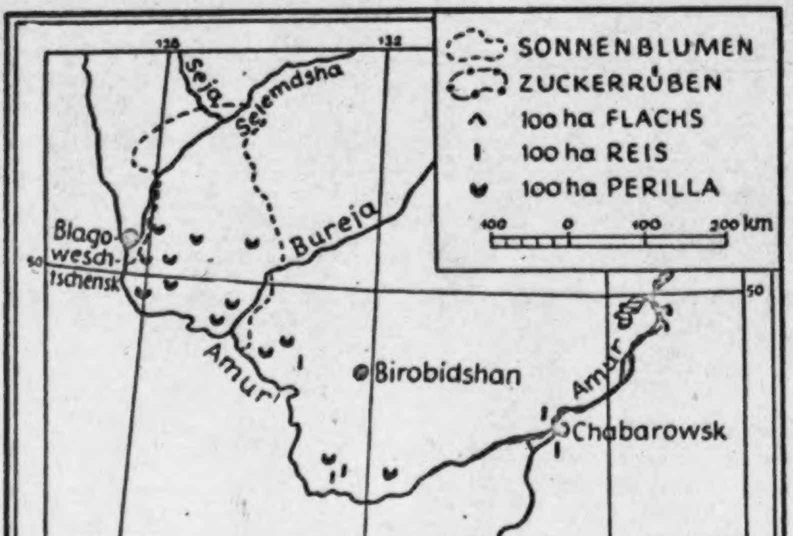
/271/ /Sketch Map:/

/272/Voroshilov constitutes the center of this important agricultural 361
area. Voroshilov lies at the point where the Ussuri Railroad meets
the Manchurian Railroad, which, hurrying from Transbaykal across
Manchuria, again enters Soviet Russian territory here. The city lies
30 meters above the sea and is 102 kilometers from Vladivostok. It
has 70,600 inhabitants (1939) and is the center of a lively food industry. [258]
It has a large oil and fat works for processing soy beans. To
this works also belongs a soap-boiler and a factory for cosmetic articles.
The city has special importance as the seat of two first and largest [388]
sugar factories in the Far East. The city of Spassk (approximately
30,000 inhabitants), which lies southeast of Khanka Lake, should be
mentioned as the next most important locality. In addition to flour [389]
mills and oil pressers, Spassk has the largest cement factory in the
Far East. As the last locality on the railroad before the Manchurian
border, Grodekovo (approximately 10,000 inhabitants) is worthy of
mention. Grodekovo already lies in the western mountains, but with
its predominantly wooden houses, it gives a typically Russian border
impression, despite its nearness to the border.

From Voroshilov the railroad leads to the south first through
hilly country, then, 30 kilometers from Voroshilov, it crosses some

Sketch Map:

241


SONNENBLUMEN
ZUCKERRÜBEN
100 ha FLACHS
100 ha REIS
100 ha PERILLA
100 0 100 200 km
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132
136
50
40
Seja
Selemdsha
Bureja
Blagowesch-tschensk
Amur
Birobidshan
Chabarowsk
Ussuri
MANDSCHUREI
Wladiwostok
JAP. MEER

◌ sunflowers

◌ sugar beets

^ 100 hectares of flax

I 100 hectares of rice

◡ 100 hectares of perilla

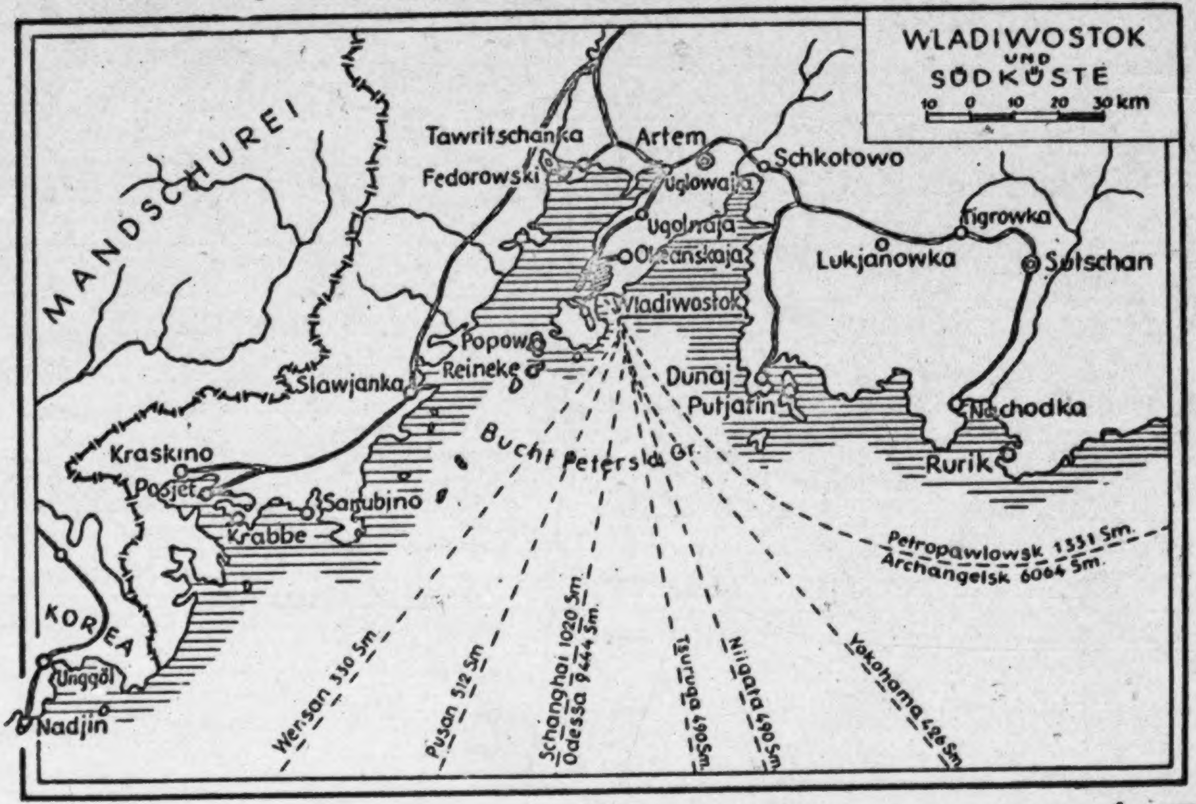
361 low ridges of the Sikhote-Alin' and enters the Muravyev-Amurskiy Peninsula and finally reaches Vladivostok, the main town and the most important harbor of the Soviet Union on the Pacific.

Vladivostok was founded in 1860. In 1872 the base of the Russian Pacific naval fleet was transferred here from Nikolayevsk on the Amur, and since then Vladivostok has been the center of the military power of the land on the Pacific. Economically, however, the city developed only slowly. In 1882 only 5,000 persons lived in the city. At the same time somewhat regular shipping between Vladivostok and the Black Sea harbors of Russia was taken up. However, the city's rise to become the economic center of the land began only after the construction of the Ussuri and Manchurian Railroad. [504] Through this railroad Vladivostok first became an important Pacific harbor, especially in transit shipping, and in this it is a harbor for all of northern Manchuria. The more recent development of the city into an industrial city has also kept pace with its development into an important harbor. [161] In 1897 the city had a population of 21,000 persons; in 1914 it was 59,000; in 1926 it was 107,980; and in 1939 it was 206,400. At present it is more than 300,000.

361 133 504 The city lies on the well protected and deep bay of the "Golden Horn" at the southern end of the Muravyev Peninsula opposite the large Russkiy Island, which is richly divided up. The peninsula and the island are separated by the "Eastern Bosporus," which extends from the Amur Bay in the west to the Ussuri Bay toward the east. The harbor is unique and one of the best natural harbors in the world, as the designations already indicate. The "Golden Horn" penetrates from the south into the Murayev Peninsula and bends then almost at a right angle toward the east (see map). /273/ /Sketch Map of Vladivostok and the Southern Coast/*/274/ The north-south section forms the outer bay and is 3 kilometers long; the west-east section constitutes the inner, harbor bay and is 3.2 kilometers long. The width of the "Golden Horn" is 800 to 1,000 meters; the depth in the interior is 10 meters, and at the entrance of the bay it is 28 meters. Mountains surround the bay and protect it from the cold northwest and west winds. Mountains also rise 50 to 100 meters on the Shkota Peninsula, which separates the outer bay from the Amur Bay. Nevertheless, 361 504 the harbor freezes for three to four months every year, and throughout the winter three ice breakers are in uninterrupted service to keep the harbor and the entrance free of ice. The outer bay and the western part of the inner bay above all belong to the commercial harbor, while

*[cf. cat. 116, p.317 -- Analyst]

Sketch Map of Vladivostok and the Southern Coast


WLADIWOSTOK
UND
SÜDKÜSTE
10 0 10 20 30 km
MANDSCHUREI
Tawritschanka
Artem
Schkotowo
Fedorowski
Uglowaja
Ugolnaja
Okeanskaja
Wladiwostok
Lukjanowka
Tigrowka
Sutschan
Popow
Reineke
Slawjanka
Dunaj
Putjatin
Nachodka
Rurik
Bucht Peters d. Gr.
Kraskino
Posjet
Sarubino
Krabbe
KOREA
Unggi
Nadjin
Wonsan 330 Sm.
Pusan 512 Sm.
Schanghai 1020 Sm.
Odessa 9444 Sm.
Tsuruga 490 Sm.
Niigata 490 Sm.
Yokohama 486 Sm.
Petropawlowsk 1331 Sm.
Archangelsk 6064 Sm.

3: Thiel--317 K-4,5(no date) 1953

RRI Siberia RRI

/273/

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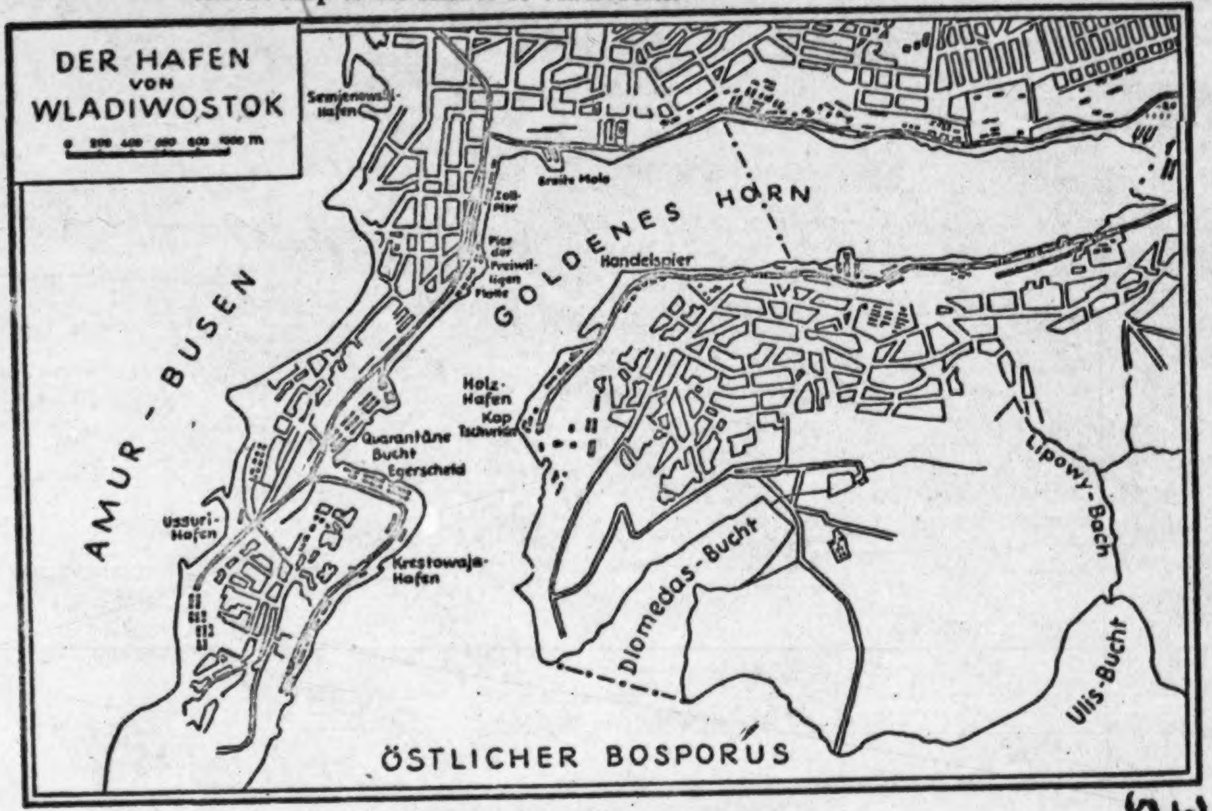
361

the section farthest in of the inner bay has been built up as a naval harbor and is closed to commercial ships. Additional harbor installations lie on the "Eastern Bosporus" and on the outer side of the Shkota Peninsula. In detail the harbor houses the following installations: 361 504

1. Krestovaya Harbor: It stretches at the foot of Krestovaya Mountain, which is 94 meters high, and has quays which are 486 meters long. This harbor is used especially in the winter since it is easiest to keep the waters open here.
2. The Egersheld, which is at the same time a quarantine harbor and which has a quay almost 950 meters long. Here the most active life prevails in the summer. This harbor is specially built up for the turnover of grain, and it has the most modern loading equipment and granaries.
3. The Harbor of the "Voluntary Fleet" (Dobrovolnyi Flot). It received its name from the Organization of the "Voluntary Fleet," which was founded in 1870 and which was the first to take up the task of connecting the mother country with the Far East.
4. The Customs Pier and the so-called "Wide Mole," which takes up the northwestern angle of the Golden Horn.
5. The Commercial Pier with the "Wide Pier" (Shirokiy Pir) on the southern side of the bay. This has extensive track installations and the largest storehouses. The quay installations are 1 kilometer long.
6. The Wood Harbor, which lies somewhat farther south on Cape Churkin.
7. The Ussuri Railroad Harbor on the western side of the Shkota Peninsula. This has extensive installations for oil and petroleum.
8. The Semyonovskiy Bazar, which likewise lies on Amur Bay. It serves coastal traffic predominantly.

All the quay installations together have a total length of more than 4 kilometers, and the network of tracks, which span the harbor and all its installations, is 335 kilometers long (1937). From 1933 to 1939 there was a further building up of the harbor, and thus it is in a position to handle an annual turnover of 4 to 5 million tons. In the first period of the development of Vladivostok, the supplying of water caused some difficulties. But these have now been overcome by means of a large water storage installation on the /275/ /Sketch Map of the Harbor of Vladivostok/ /276/ so-called "Second Little River" (Vtoraya Rechka) and by means of the filtering installation, holding 100,000 tons, on the inner edge of Ulis Bay, into which Lipovyy Brook flows. 361 312

Sketch Map of the Harbor of Vladivostok


DER HAFEN
VON
WLADIWOSTOK
0 200 400 600 800 1000 m
Semjenowskij-Hafen
Breite Mole
Zoll-Pier
Pier der Freiwilligen Flotte
GOLDENES HORN
Handelspier
AMUR - BUSEN
Holz-Hafen
Kap Tschurkin
Quarantäne Bucht
Egerscheld
Ussuri-Hafen
Krestowaja-Hafen
Lipowy-Bach
Diomedas-Bucht
Ulis-Bucht
ÖSTLICHER BOSPORUS

3: Thiel-319 K-4,5 (no date) 1953 RRI Siberia RRI

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1275/

361
504

3: Thiel--320 K-4,5 (no date) 1953 RR1 Siberia RR1

361 The city of Vladivostok itself is very narrow in the overall in-
stallation. It encloses the "Golden Horn" and also stretches along
Amur Bay. A section of the city also lies on the northern end of
Russkiy Island opposite the entrance into the "Golden Horn." The
hills rising quickly from the coast give an almost southern appearance
to the view of the city with its rows of houses rising on the slopes.
The main streets as a rule run parallel to the coast. The secondary
streets are often so steep that they can be traveled only with difficulty.
In contrast to the narrowness of the city and the tasteless apartment
houses and business houses crowding the city, the varied, green sur-
roundings, which are decorated by numerous, beautifully situated
[162] summer houses, appear especially pleasant. Russians constitute the
overwhelming majority of the population, but the percentage of
Chinese and Koreans is very significant. In 1926 there were 23,400
Chinese, 7,000 Koreans, and 600 Japanese in a total population of
107,000. The Chinese as a rule are unmarried and work by preference
as harbor workers.

361 Vladivostok is not only a harbor city, but it also has developed
into an industrial city. In first place here is the fish industry, which,
[255] however, is not concentrated solely in the city but rather is distributed
over many localities in the immediate and more distant environs of
the city. The fish industry is occupied predominantly with the canning
of fish and crabs. Numerous fishing collection points along the entire
southern coast supply the material. The most important localities
lie on bays or on islands. The most important places are Nakhodka,
where a railroad line from Suchan ends, Sarubino, and the islands of
Popova, Reineke, and Putyatin. In second place is the wood industry,
[322] which processes valuable deciduous trees and supplied wood products
such as matches, veneer sheets, and furniture. In addition, the city
also has flour and rice mills, leather factories and soap boilers.
[396] Vladivostok has great importance as a naval harbor and a shipyard,
[399] especially for naval ships. There is in addition a plant for constructing
airplanes. An oil refinery supplements the entire industrial and
[382] transportation economy. Among the numerous scientific institutions
in Vladivostok, the branch office of the Academy of Sciences is
[815] especially prominent. It has an important share in the exploration of
the Far East.

361 Apart from this fish industry, which is distributed among
numerous localities along the coast, the area around Vladivostok is
322 also rather richly equipped with other industrial installations. Among

these the wood industry should be mentioned in first place. It is con- 361
centrated above all in Shkotovo (approximately 10, 000 inhabitants) 322
and Tigrovka (approximately 5, 000 inhabitants), both of which lie
on the railroad line to Suchan. The wood industry is also concentrated
in Okeanskaya (approximately 2, 300 /277/ inhabitants) to the north
of Vladivostok, where a large wood factory delivers veneer wood for
export.

The industry in Vladivostok, like industry generally in the 316
southern Ussuri country, is based on coal, which is on hand here in
rich measure. Besides the various smaller coal mining localities,
Artem and Suchan should be mentioned here as the principal localities
producing coal. Already by 1938 the coal mined in Artem exceeded
that mined in Suchan by threefold, and since then coal mining in
Artem has been very much further increased. To Artem belong also
the two coal districts, Ugol'naya and Trudovaya. The new railroad 496
line, which leads along the western coast of the Bay of Peter the Great
to Pos'yet and Kraskino, connects the most important coastal localities,
which above all pursue the catching of fish. In the same region there 231
are some sovkhoz for breeding stags at Peschanaya, in Krabbe, and on
the Gamova Peninsula.

Sakhalin Island

Sakhalin came to Russia through the treaties of Aigun (1858) 648
and of Peking (1860). However, until 1871 Russia had to share possession of the island with Japan, which in early times had already
erected numerous factories in the southern part of the island. Through
the unhappy Russo-Japanese War, Russia lost the southern half of the
island to Japan. The fiftieth latitude was determined as the boundary
line. The outcome of World War II brought the Soviet Union again in
possession of the entire island.

Sakhalin covers 80, 000 square kilometers and stretches from [131]
north to south in an almost meridional direction for about 1, 000 kilometers. Once feared as a prisoners' colony of the Czarist empire, 132
the island is notorious for its raw climate. The famous Russian writer
A. Chekhov writes, "Sakhalin has no climate at all; the weather is
eternally bad and gloomy." The island owes this unhappy reputation
to the influence of the cool Sea of Okhotsk, to which the bulk of the
island is fully given over. The greatest part of the island is covered 137
with thick forests, which recall the taiga of Siberia. Along the coast

137 appear extensive moss steppes, which have a similar character to that
of the tundra, and these regions have an almost polar appearance.
The south, on the other hand, has milder traits in places. Since rich
135 coal and oil supplies have been discovered in very recent times and
since their exploitation has begun, the island is sliding more and more
into the foreground of economic interest; the population is increasing
rapidly and is adapting itself to the island. With this the bad reputation
of the island is also beginning to change.

According to the relief, Sakhalin is divided into two parts: a
133 larger, mountainous section in the south, and a smaller section in the
north which is gently rolling to hilly. The mountainous south consists
of two mountain chains, which run in the direction of the island and
which are separated from one another by a depression stamped as a
longitudinal valley. The depression is drained toward the north by
the Tym' and toward the south by the Poronay.

/278/ The eastern mountain range, whose highest elevations are Nevel'skiy Mountain (2,013 meters) and Lopatin Mountain (1,680 meters), is more heavily divided up than the western mountain range, which also is lower generally and whose highest point, the Aimi Yama, reaches only 1,641 meters. In its external impression, the eastern mountain range should be designated as more of a ridge mountain range. It consists principally of metamorphic rock, slate, sandstone, and limestone which is similar to marble. These are the same stones as those which build up the border chains of the mainland. These sedimentary stones are in many places permeated by syenite, diabase, andesite, and basalt. Granite, however, is lacking. In terms of age, most of the sediment of the eastern mountain range is reckoned as Paleozoic. Mesozoic is diffused only in places and then is only slightly developed. It is different in the western mountain range. This is built predominantly from Tertiary layers, beside the older rock. Jurassic and Cretaceous also lay claim to a significant proportion. Cretaceous appears especially in the southwestern part and is diffused in the former Japanese territory. Weathering effects are very great because of the damp climate; they affect especially the parts of the mountain range without forests. The sharper forms and the greater variety in the relief can be traced back for the most part to the varying powers of resistance of the different types of rock. The loamy and gravelly slate weather especially quickly.

The Tertiary deposits, which have a wide diffusion in all of Sakhalin, and the Cretaceous sediments are heavily destroyed. The mountain-forming occurrences, which determine the relief of today, began after the deposit of the most recent, Pliocene Tertiary layers and ended still before the Quarternary sea transgression, whose sediments are here deposited almost horizontally. But the present-day mountain ranges of Sakhalin cannot be traced back to Tertiary dislocations alone, for earlier, in a period of the earth's history which has still not been determined exactly, the older layers were already folded up into a mountain range, running in the same direction as today's mountain ranges. Thus in the Tertiary period only a new forming occurred. The post-Pliocene transgression separated Sakhalin from the mainland and flooded all the low-lying sections of the island. It even penetrated between the two mountain ridges, so that these mountains projected from the sea as large, high islands (207). Later, in elevations following one another at several intervals and perhaps interrupted also still by lighter depressions, the island then emerged from the sea in its present form. Even today these movements have still not been concluded, as is indicated by the earthquakes which have been recorded up to the present. Traces of glaciation are nowhere to be found.

The longitudinal valley between the two lines of mountain ranges is to be regarded as a graben depression. It is 5 to 30 kilometers wide, and in its entire length it is covered by post-Pliocene sea deposits. The watershed, which separates the Tym' which flows toward the north from the Poronay in the south, lies only 150 meters high. /279/ The floor of the valley is mostly level and is covered with a fertile loamy soil. Protected by the two lines of mountain ranges, the valley has a more continental climate, with the warm summers corresponding to its southern location. Accordingly many Russians have settled here in a series of villages.

Toward the north both lines of mountain ranges move back from the coast, quickly become lower, and go over into a hill country, which fills the interior of the northern part of the island with gently rolling ridges which never project 500 meters. Thereby the two ridges and also the longitudinal valley still distinguish themselves in the relief far toward the north. The coast itself is followed by a broad plain,

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207. Tanfiliev, G.I., Geografiia Rossii: Relief Aziatskoi Rossii /Geography of Russia: The Relief of Asiatic Russia/, (Odessa, 1923), Vol. II, p. 265.

133 which consists of recent and post-Pliocene deposits and which for the
most part is covered by a tundra vegetation interlarded with bushes.
[137] The extent of this plain varies, being largest in the north around
Sakhalin Bay. The plain ends in a 2 to 6 meter step which is delineated
rather sharply everywhere. With this step the hill country then begins.
This hill country as a rule bears a thick taiga consisting of spruces and
larches. The watershed regions are scarcely perceptible in the relief,
but they show up in thicker and higher forest growth. In places the
hill country step also goes to the coast itself and then forms a higher,
steep slope, which can reach 15 to 26 meters. (207) Taiga and sea
then come very close to one another.

Schmidt Peninsula, so named in honor of the well-known
Sakhalin explorer, forms the extreme northern end of Sakhalin. This
peninsula forms in miniature a true model of the geological and
tectonic structure of the southern section of the island, with even
the intrusive phenomena being the same. Here, too, we find an
eastern mountain range and a western mountain range with a depression
lying between. In the "Tri Brata," the "Three Brothers," the
eastern mountain range reaches a height of 708 meters. For the most
part this range declines steeply to the sea, and in the north it forms
the rocky Cape Elizabeth, the most northerly point on Sakhalin. The
western line of mountains, which likewise declines steeply to the sea,
attains a height of only 406 meters. The depression lying in between
ends in the north with a lake, which is separated from the sea by a
narrow tongue of land. On the land narrows which connects Schmidt
[315] Peninsula with the main part of the island lies the oil fields of
Sakhalin which today have the richest yield.

Sakhalin's coast is generally but little divided up. In contrast
to the more contiguous western coast, the northern coast and the east
coast represent typical coasts with alluvial lands and numerous fresh-water
lakes. Baykal Bay in the northern part of the island represents
[505] the largest fresh-water lake. It can be traveled by coastal ships with
a draught of up to 3.5 meters. Here on the eastern side of the bay
lies Moskal'vo oil harbor, which has a railroad connection to the oil
region in the eastern part of the peninsula. Still more strongly marked

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207. Tanfiliev, G.I., Geografiia Rossii: Relief Aziatskoi Rossii /Geography of Russia: The Relief of Asiatic Russia/, (Odessa, 1923), Vol. II, p. 266.

is the alluvial land character of the eastern coast, on which there is one fresh-water lake after another, almost lined up in a row. All these lagoons are extremely narrow, but they are up to 160 kilometers long. In contrast to the restless sea, these lagoons permit /280/ a protected water traffic along the coast. Sandy places with dune formations, however, are only rarely to be found here. Mostly vast, tundra-like moss steppes, which consist of peat layers up to 15 meters thick, spread out here on the lower courses of the rivers, and are especially extensive on the Tym'. Here, as on the western side of the island, these steppes are excellent meadow lands for reindeer herds. 133 [135]

The difference in the coastal formation between the western and the eastern parts of the island can be traced above all to the prevailing current. On the eastern side the current goes along the coast toward the south. On the western side a current toward the south prevails within the Tatar Sound on the coast of the continent, while on the coast of Sakhalin an opposing northern current predominates. This northern current, however, as Zhdanko (188) has indicated, does not run regularly; rather the current changes in connection with the tides; thus there are only tendencies toward an irregular level coast.

Climatically the low northern part of Sakhalin is the most disfavored, since no limitations are set to the raw influences of the Sea of Okhotsk. Therefore, the appearance of the Daur larch is just as typical here as the appearance of the Ayan spruce. Toward the south in increasing measure the taiga also has deciduous trees of the same type mixed in as are characteristic of the Sikhote-Alin'. A consequence of the damp climate is not only the moss areas near the coast but also the meadows which appear in the more protected flood plains of the rivers. These meadows have a very heavy growth of grass, which in places is 3 to 4 meters high. Senecio cannabifolia and Petastes japonicus should be mentioned as among the principal types represented here. In the mountains themselves the stone birch, Betula ermani, appears as the characteristic tree in the heights as do the spruces and pines. In more protected valleys stocks of pure deciduous trees are no rarity. Worthy of note is the appearance of wild Kuril 137

188. Zhdanko, M. "Isvlechenie iz doklada v zasedanii . . I.P.G.O." Excerpts from the Material at the Meeting of the Geographical Society in 1915/, Izvestiia of the Imperial Russian Geographical Society, 1915.

137 bamboos (Sasa Kurilensis), which, however, are limited to the western
mountain range. This is the only region in the Soviet Union in
which bamboo grows wild. In places the bamboo forms a thicket
which appears almost tropical and which is difficult to get through.

The native population in northern Sakhalin is very small in
563 162 231 number and comprises some thousand Gilyak and Orok. The Gilyak
reside more at the mouths of rivers on the coast and provide for themselves
by fishing and hunting. The Orok occupy themselves principally
with the breeding of reindeer; for this they wander as nomads, even
though within narrow borders, between the moss steppes in summer
and the border regions of the taiga. The number of reindeer is modest.

563 The Russian population in northern Sakhalin has increased
162 many times in number in the last three decades. In 1926 it was
estimated to be 20,000, but already before World War II it grew more
361 than 100,000, and since then it has further increased. The population
is concentrated essentially in three areas: Aleksandrovsk and the
western coastal strip, /281/ which is made prominent economically
by its coal mining; then the oil district in the north and on the northeastern
coast; and, finally, in the valley of the Tym' and Poronay,
which has a smaller percentage of the population. The population
433 here is more agricultural. In general, however, the agrarian economy
is still little developed. In the last few years the Soviet administration
has striven to ensure food for the industrial population both in the coal
oil regions at least in part from local production. To be sure, the
areas under cultivation are planted with bread grains, especially in
the protected longitudinal valley, where there is a large number of
kolkhoz and sovkhoz; however, the production yields only slight surpluses.
In the other regions the climatic conditions are too unfavorable
to be able to develop cultivation of grain in a grand style here. On
244 the other hand, it is different with the cultivation of potatoes, cabbage,
and vegetables. Great successes are to be recorded in this connection.
Especially prominent are the high yields of the potato harvests. On
the basis of this experience a transition has been made in very recent
times--apart from supplying the necessary potatoes for human
nourishment--to enlarging the cultivation of potatoes in a planned
fashion and to developing the breeding of pigs on a large scale on the
basis of this. There are numerous reports of success on this.

361 The capital of northern Sakhalin (the capital of the oblast is
now Yuzhno-Sakhalinsk) is Aleksandrovsk, which has approximately
20,000 inhabitants. It is the export harbor of the coal region. The

The
harbor has in very recent times been expanded and provided with 361
modern loading equipment. Since the Tatar Sound is very shallow, [504]
this equipment had to be moved very far out into the sea. To be
mentioned in second place is Okha (approximately 25,000 inhabitants),
the most important center of the oil region on the northeastern coast.
During the last war the city got a sea harbor of its own, which is supposed
to be usable throughout the entire year. South of Okha lies 315
Ekhabi, which has often been mentioned recently for its rising oil production.
A railroad and an oil pipe lead from Okha to the oil harbor
of Moskal'vo, which lies on the eastern side of Baykal Bay in the northern
part of the island. Furthermore, in the past few years there have 226
been established along the coast numerous, permanently inhabited
fishing bases, which give life to the entire picture along the coastal
strip. The largest part of the interior is still untouched and given over
even today to the native population and their primitive economy.

In southern Sakhalin (Karafuto), which was formerly Japanese, 133
the natural lanscapes continue as they have already been generally
described. The western mountain range, which here has heights of
up to 1,375 meters, forms the backbone and stretches to the south beyond
the 46th latitude, while the eastern mountain range already ends
north of the 49th /282/ latitude. The Poronay Valley ends even before
that after it has spread out to a width of 30 kilometers.

As in northern Sakhalin, so here, too, the largest part of the 137
land is covered with primeval forests, which consist of the same type
of trees as in the north, only here the percentage of deciduous trees
is larger and increases especially on the lower slopes and last spurs of
the western mountain range. Even though the climatic conditions became
somewhat milder with the southern location, tundra-like moss [231]
steppes appear here also. Reindeer breeding is still pursued today by
the native population, the Orok and the Tungus.

The population of southern Sakhalin was 332,000 in 1936 and 161
412,000 in 1940; the increase can be traced for the most part to immigration
from Japan. Of the old, native peoples scarcely 2,000 existed;
of these the Ainu, who number 1,500, constitute the main part. The
rest is divided among Gilyak, Orok, and other Tungus tribes.

The economic importance of southern Sakhalin lies in the 489
wood supply of its forests, in its coal deposits, and in the wealth of
fish in the waters near the coast. The Japanese have done much for
the economic development of the land and also have attained much.
Above all they are to be thanked for the opening up of the land through

489 means of transportation. They have built 653.2 kilometers of rail-
road lines, and in addition they have improved the land roads, too,
so that they can be traveled regularly by buses. However, this opening
up to traffic has generally been limited to the regions near the coast
and to the most southerly part of the island, while the greatest part of
the interior, as in northern Sakhalin, remained left to itself. Now the
316 most important coal deposits also lie not far from the coast, and the
Japanese succeeded in bringing production in a large number of mines
up to approximately two million tons by the beginning of the last war.
Of this 500,000 tons could be exported to Japan. The remainder was
used in Sakhalin, above all in the wood industry, which had been
289 developed on a large scale by the Japanese. Since 1929 the Japanese
had gone about, in a planned fashion, the building up of a cellulose
and paper industry in southern Sakhalin, in order to be able to supply
their home economy with these products. At the end, just before the
outbreak of war, there were eleven large cellulose and paper factories
in the country, and their production constituted almost 90 percent of
the industrial production of southern Sakhalin. The share of these
factories in the total production of Karafuto was around 60 percent.
313 In addition, southern Sakhalin delivered large quantities of wood as
226 cut wood and raw lumber. Southern Sakhalin was also very important
to Japan as a base for fishing, which produced rich surpluses. However,
in one thing the Japanese did not succeed: the securing of food for
the population from the island itself. In this particular Sakhalin was
an importing region, although the Japanese made every effort to expand
agriculture and the breeding of livestock.

433 /283/ After the evacuation of the Japanese and the taking over
of southern Sakhalin by the Soviet Union, the Soviet Union has striven
to fill the land with people and to get the economy's production going
again. On this there are numerous reports, which tell especially of
the founding of kolkhoz and sovkhoz. In addition there are constant
reports on the establishment of fishing stations and of fish-processing
central stations, but there are only a very few reports on the taking
over of coal mines and of getting them into production. There is
little information on the installations of the wood industry, although
it is to be assumed that the Soviet Union has above all laid value on
getting the industrial plants into production, and apparently, too,
everything has been done so that these plants could take up their production again.

The Region of the Amgun and the Uda

This area comprises the entire, heavily divided up coastal strip on the southwestern corner of the Sea of Okhotsk from the river area of the Amgun in the southeast to the river area of the Uda in the northwest. In contrast to the better known coast, the interior of the land, especially between the Bureya Mountain Range and the coast, is still very little explored. The raw Okhotsk climate with its heavy rainfall, the heavy swampiness of the valley areas, the thick taiga of the mountains, which is difficult to penetrate and which is interlarded with high moors, and the lack of habitation of the regions offer few inducements to explore these regions.

The general character of the landscape appears to be greatly varied. Low, forested mountain ridges give way to higher lines of mountain ranges, and in between lie deeply sunken flat valleys, which often spread out into vast plains. The lines of mountain ranges stretch predominantly toward the northeast and represent in places heavily destroyed continuations of the Bureya Mountain Range and also spurs of the Dzhagdy Mountain Range. Some mountain ridges press into the sea as peninsulas, while the bays in between appear to represent broken-in grabens. Numerous small and large islands, which lie off the coast and which are summarized under the name of Shantar Islands, increase the impression of a mountain landscape sunken in the sea. Three large bays press far into the land from north to south: the narrow Nikolya Bay in the east, which is 50 kilometers long and up to 20 kilometers wide, the wide Ul'ban Bay in the middle, and the Tugur Bay in the west, into which the river of the same name empties. In contrast to these three richly divided bays of the sea, the large Uda Bay projecting toward the west appears monotonous.

The coast is for the most part rocky in its entire course from the mouth of the Amur to the mouth of the Uda. It is especially rocky in those places where the lines of mountain ranges and mountains stretching there break off steeply at the coast. These mountains consist mostly of loamy and gravelly slate and sandstone, /248/ which are laid in more or less steep faults stretching toward the northeast. Less commonly granite and porphyry appear between the sedimentary rock. Where this is the case, these mountains can be recognized from a distance in relief with their massive, peaked forms. The beach plains and the floor of the sea are saturated with remains of mussels, especially of Balanus, Cardium californiense, Natica aperta, Trochus schantaricus, 133 etc. (127) The sea narrows between the Great Shantar Island and

127. Meglitskii, G. "The Shore of the Sea of Okhotsk and the Tungus Region" /in Russian/, Gornyi Zhurnal, No. 8, 1893.

the mainland is very shallow and nowhere exceeds a depth of 23.8 meters. Between the individual islands the sea is still shallower, and Yakshina Bay, which penetrates to the south of Great Shantar Island, is not navigable at all for ships at the time of ebb-tide. The line at which the sea becomes 50 meters deep leads from the northern tip of Sakhalin Peninsula directly toward the west and encloses the entire island world; thus here this line runs 100 to 125 kilometers from the coast of the mainland; while on the Okhotsk coast, stretching to the northeast, north of the Uda Gulf the sea is 200 meters and more deep already at a distance of 5 to 10 kilometers from the coast. Between the islands and especially also in the bays, the tides make themselves strongly felt, the local fluctuations in the level of the water reach 4 to 7 meters. The raw influence of the Sea of Okhotsk, which affects the entire province, is caused among other things by the sea current stretching from the northeast along the coast. This current brings large ice masses from the north in the spring and piles them up between the islands and on the mainland coast. On the coast stretching toward the southeast between Nikolya Bay and the mouth of the Amur, a leveling coastline has formed as a consequence of the equal current, and thus lagoons and narrow tongues of land appear here. Also the collecting of sand in the "Amur-Liman" in the north between the mainland and the northern end of Sakhalin Island is a disadvantage which the sea current brings. Great Shantar Island consists of the same geological material as the mainland mountain range which stretches toward the northeast; thus Great Shantar and the entire island group can be regarded as parts of the mainland torn away by the sea. Great Shantar Island consists of a maze of forest-covered summits and mountains, which are up to 1,000 meters high. In between, vast moss moors, swamps, and lakes cover the surface. The other large and small islands are also in part covered withforests and make a picturesque scene with their rocky formation. All the islands are uninhabited.

The Amgun has a total length of more than 800 kilometers, of which around 400 kilometers are designated as navigable. The river comes from the eastern slope of the central Bureya Mountain Range and flows next between this mountain range and the Badzhal'skiy Mountain Range toward the northeast. Then the Amgun enters a low plain, which here, on the middle course of the Amgun, spreads out to a great width of up to 100 kilometers. In this plain very important rivers flow into the Amgun from all sides. Among these is the Kerbi, which also comes from the west. The area rich in gold around the upper course of the Kerbi was already mentioned earlier. The low plain, from which individual hills and mountains project directly, is filled with moors, /285/ swamps, and lakes. Best known of these lakes is the large Chukchagirskoye Lake, which has a large number of islands. A broad and likewise damp valley area remains with the Amgun on its further course. In the north and south this valley area is followed by a highland, which is covered with forests, which has gentle slopes, and which is up to 500 meters high. The heights of this highland also occasionally come right to the river and then often form steep drops. Notorious is the area around the lower course of the Amgun, which spreads out widely and flows together with the Amur lowland. The drop here is so slight that the Amgun dissolves into a vast number of arms, still waters, and long extended lakes and must wind through the terraine in large and small bends.

The vast, flat swamp and moor plains produce an entirely different picture here from the meadow steppes of the Amur plains. The Amgun plains are, of course, also generally flat, but they are in many cases given a somewhat uneven form by clusters of grass and moss hills, between which blank water often shows through. But the long, irregular strips of forests and bushes constitute the greatest difference. These strips twist through the wide plains and follow the river courses on both sides like gallery forests, causing the river courses to be visible from a distance. On the Amgun the forests consist predominantly of deciduous trees. It is typical of this entire cool and very damp region from the Amgun to the Uda that the forest settles only on the better-drained spots where the surface water and the ground water is in motion, i.e., on the rivers and the slopes. The flat ridges or plateaus are again more unfavorable. On them high moor formations appear often as enemies of the forests; thus the trees become "water-seeking" and gradually decay. The traveler, therefore, must always keep away from the valley bottoms and use the ridges and heights, even though these project only a little. However, often here, too, he encounters a jumble of pathless flat and high moors in the flat watershed regions, and thus he can still go forward best along the slopes.

000 watershed regions, and thus he can still go forward best along the slopes.

361 The Amgun region is as good as uninhabited. Only on the largest rivers is human life to be encountered here and there: wooden huts of some Gilyak or also of Tungus Olcha and Negidal, who live from fishing and hunting. On the Amgun itself, however, there are already Russian settlers, who have come together into some small localities. The most important is Kerbi which lies at the mouth of 505 the river of the same name. The Amgun can be traveled by small steamers as far as Kerbi. The Amgun brings goods to supply the area here, and the goods are then towed in boats down the Kerbi to the gold regions.

133 The valley of the Tugur becomes up to 20 kilometers wide and gives the same picture. Here, too, moss moors extend far down the valley. The swampiness is strengthened here still more by the appearance of permafrost.

/286/ The river area of the Uda is very extensive. In the Uda collect waters which come from the Dzhagdy Mountain Range and also from the Dzhugdzhur Ridge. The Uda's left tributary, the Maya, which is more than 300 kilometers long, separates the Stanovoy from the Dzhugdzhur. Here, too, the great swampiness causes the traveler great difficulties. The Uda is a mountain river and flows seethingly in a bed filled with boulders and interrupted with numerous rocky islands. Only in its lower course does the Uda become quiet. Here lies Udskoye, a small Russian village, which is the center of the hunting of fur-bearing animals. This hunting still brings very rich yields in these remote mountain regions.

The Okhotsk Coastal Area

The area includes the entire western and northern coastal region of the Sea of Okhotsk, beginning at the Uda in the south and ending at Penzhina Bay in the north. With the coast being more than 2,000 kilometers long, the conditions, of course, vary in detail, but in general the prevailing character of a raw mountain forest landscape with a damp and cool climate is preserved, which is less tolerable for man than the harsh contrasts of the continental interior.

The region can be divided into two parts according to the structure of the coast and according to its forms: a southwestern part between the Uda and Okhotsk with coast which is little divided up and a northeastern part which is heavily broken up by numerous large and small bays, peninsulas, and islands. The character of the southwestern part is determined only by a line of mountains stretching parallel to the coast, the Dzhugdzhur; in the northeastern part ridges of mountain ranges are predominant which stretch irregularly toward the line of the coast. 133

In the western part, the Dzhugdzhur coast, the mountain ridges go right down to the sea and leave free for settlement by man a narrow coastal strip, which at most widens somewhat at the mouths of the rivers. The Primorskiy Ridge, which lies in front of the Dzhugzhur chain in the south between the Uda and the Ayan, even declines directly and steeply into the sea. The Dzhugdzhur, which stretches parallel to the coast and consists of several ridges, forms a contiguous mountain wall with its masses formed predominantly of granite, gneiss, and porphyry. This mountain wall shuts off the coast from the interior. The mean height exceeds 1,000 meters, and the few unprotected passes also lie almost as high. The watershed runs in the vicinity of the coast, and thus along the entire coast only short rivers, which, however, seethe because of the steep slope, flow down into the sea. Therefore, the deeply etched valleys opening on the sea stand in sharp contrast to the more horizontal lines of the round peaked surface of the massif of the mountain range. The valleys are filled with thick /287/ taiga, teeming with underwood, and, with the narrow bottom of the valley saturated with boulders and scree, these valleys offer man only a very difficult opportunity to penetrate into the mountain range; and yet these sharply etched and steeply rising valleys are the sole routes which lead from the coast into the interior of the land. Thus the fact that the coastal strip is cut off from the hinterland is a special mark of this region. The ridge is more thickly forested only on the slopes, while the heights themselves have only a spotty, crippled growth of trees or lie completely bare in the highest places. The passes, too, mostly lie above the tree line and are scarcely usable in winter as a consequence of violent snowstorms.

The interior of the mountain ridge is as good as uninhabited. 361
Apart from hunters, only a few Tungus with small reindeer herds cross 505
the desolate mountain areas. On the coast there are a series of Russian fishing settlements. The principal locality here is Ayan. It lies on a favorable natural bay, which is approximately 1 kilometer both long and wide and 6 to 38 meters deep. Since the entire Dzhugdzhur coast s blocked by ice in the winter, the harbor can be used only in summer, although constant violent sea winds often hamper the departure of sea

361 ships and indeed in many instances make departure impossible. From
505 Ayan a route starts toward Yakutsk. This route rises steeply over the mountain range to Nel'kam on the Maya, a left tributary of the Aldan. From here the rest of the way is on the rivers, via the Maya, the Aldan, to the Lena. Ayan, which is notorious for its heavy rainfall, cannot really make progress despite its favorable natural harbor; and, although the beginnings of its development reach far back, Ayan has scarcely 1,000 inhabitants.

In the north the Dzhugdzhur Ridge bends away from the coast
361 and makes way for a vast coastal lowland which penetrates deeply into the land. Here, at the mouth of the Okhota, which forms a good natural harbor, lies the village city of Okhotsk, the first and oldest harbor of the Russians on the Pacific. In addition to a telegraph line, Okhotsk has a land route connection with Yakutsk. The use of this route causes fewer difficulties than the route from Ayan. At present Okhotsk is an
513 important fish collection point. On the coast and also in the hinterland
241 of the depression, numerous Russians have settled. In addition to an
231 agricultural economy based on the cultivation of potatoes and vegetables, these Russians devote themselves to the breeding of livestock, which does very well here in the natural meadows of the alluvial plains. Tungus Lamut have joined the Russians, too. These Lamut, in addition to fishing, devote themselves also to agriculture, which they have taken over from the Russians. They apply themselves with the same care to the ox as for generations they have done with the reindeer. Farther in the hinterland of the lowland there are still Reindeer Tungus in large numbers. These Tungus wander as nomads between the bottom of the valley and the mountain tundra.

Northeast of Okhotsk the coastal provinces /288/ have another,
133 more varied character. There is not, as is often still represented on many maps, an interrelated mountain chain which runs parallel to the coast; at least there is none between Okhotsk and the Yama, a river east of the P'yagina Peninsula. On the contrary, east of the Okhotsk, spurs of the Cherskiy Mountain Range run into the coast almost at right angles, and between these spurs relatively wide and long valley areas stretch from the coast far into the interior. In addition, in order to make the picture more colorful, there is farther to the east another orographic element, which is limited, however, to the peninsulas and islands. This is a heavily destroyed and broken up mountain chain, which runs approximately parallel to the coast and which, according to the present level of knowledge, is reckoned as belonging to the inner arc of the

Tertiary fault mountain range zone of East Siberia. On the one side, 133
this mountain chain is supposed to have been connected with Sakhalin, and on the other it is supposed to appear again in the Taygonos Peninsula, in the western part of the Penzhina depression, and in the northern part of the Anadyr' region. In the coastal region this chain appears characteristically in the Chutnavar Mountains, which stretch in a wide peninsula from west to east and which are separated from the mainland mountain ranges by an extensive valley which runs in the same direction. Through this valley flows the Kaza Tau'. The mainland mountain ranges referred to above are spurs of the Cherskiy Mountain Range, and with their ridges and the valley areas lying in between, they run into the Kaza-Tau' valley almost perpendicularly; thus in a narrow area the opposing construction appears clearly. For the rest the Tertiary mountain chain appears only in island remains, on the Koni and Pyagina peninsulas and then on Taygonos Peninsula.

East of the Yama begins the Kolyma Mountain Range, which from here on stretches toward the northeast parallel to the coast and then in the hinterland of the Taygonos Peninsula turns toward the north-northeast into the interior of the land. But, in contrast with the Dzhugzhur, the watershed lies far from the coast. The mountain range slopes toward the coast and is broken up into individual parts by numerous long and relatively wide erosion valleys, which run almost perpendicular to the coast. Thus the general impression remains the same as in the west between Okhotsk and the Yama, where the spurs of the Cherskiy Mountain Range meet the coast at the same right angle. However, in the coastal region of the Kolyma Mountain Range the valley areas and also the coastal plain are smaller in size. In the background of the Gizhiga Bay, between the Kolyma Mountain Range and the Taygonos Ridge lies an extensive depression, which is filled with Tertiary deposits. In this depression coal-bearing layers have also been discovered in very [135]
recent times; these layers contain industrially valuable deposits of brown coal and lignite. Natural outcroppings of the productive seams are even to be observed on the coast of Gizhiga Bay.

The northern location comes out more and more in the landscape 137
picture of the coastal region east of Okhotsk. The protected valley areas are as a rule covered with good meadows, which offer /289/ usable pastures for cattle and horses and which are also rich in hay fields. The courses of the waterways are followed by meadow bushes and rows of poplars. Birches set in toward the upper courses. The slopes are mostly covered with larch forests, which become light and low in the heights.

137 The mountain ridges themselves are either bare or have underbrush
and reindeer moss growing on them.

361 As a consequence of the contrasts between the protected valley
563 areas and the ridges covered with moss tundra, the hinterland of the
coast here is occupied far more by Tungus reindeer nomads than the
Dzhugdzhur coast. Also, despite the northern location, the number
of coastal localities is larger here than there. Russians, however,
are to be found here less often. These localities are predominantly
occupied by sea Tungus, who, however, all cultivate some vegetables
and potatoes in addition to their fishing. Also--a fact that is especially
noteworthy--they follow the Russian example and keep cattle and
horses. However, the opportunities which are available here for
breeding livestock have still not been long exploited, and thus there
are the most favorable prospects here, especially since sufficient hay
fields are on hand to assure the supply of winter fodder. The most
important localities on the coast are Tauysk, Ola, Yamsk, and
Gizhiga, all of which lie at the mouths of the rivers of the same
[565] names. During the summer, connection between these localities is
[487] maintained by small coastal steamers; during the winter the connection
is over the so-called coastal route which leads from Okhotsk along
the coast to Kamchatka and which is traveled by horse, reindeer, and
dog sleds. All of these coastal localities, however, are exceeded in
importance by the newly founded city of Magadan, which came into
being only shortly before the last world war and which has already far
surpassed the old Okhotsk as a harbor.

Magadan owes its founding and its rapid growth above all to
135 the hinterland which is rich in natural resources. Here in the area
around the upper course of the Kolyma extraordinarily rich gold fields
have been discovered; mine gold as well as gold streams have been
found. A more exact exploration of the region showed the existence
of hard coal and significant supplies of less common elements. The
361 exploitation, which was taken up rapidly, led to the formation of
numerous new localities, and thus there are now more than 50 settlements
in the upper Kolyma region. The centers of industrial life lie
in the area around the source of the Kolyma and on its tributaries,
the Berelyakh and Tenka. The most important of the new localities
are Orotukan and Khatynakh. For connection with the outside world
491 a highway was built which can be used throughout the year; this highway
leads from Ust'-Utinaya to Magadan on the coast. Since the
Kolyma is navigable from Ust'-Utinaya on, this highway has at the

same time created the shortest connection with the entire Kolyma region. The highway is more than 1,000 kilometers long and was built under the most difficult of conditions (mountain ranges, permafrost). Bases connected with small agricultural economies /290/ facilitates the use of the road. The harbor of Magadan lies on Nagayevo Bay. Steep rocks are artificially heaped up at the foot of the landing places for sea-going ships. Ice breakers are employed in the harbor to make it possible to use the harbor for a longer period. The rapidly growing city, which in 1939 already had more than 10,000 inhabitants and today is estimated to have 50,000 inhabitants, lies somewhat at a distance from the harbor and is separated from it by a flat, rocky hill. The construction of the city was done with the most modern means. They have even succeeded in building stable six-story skyscrapers, despite the permafrost, by using deep excavations and by laying in insulating layers. 491 361 [504]

The Provinces of the Extreme Northeast

These regions are bordered on the west by the Kolyma Mountain Range, and they are divided into the Chukchi Peninsula, the Anadyr' and Penzhina region, and the Koryak Mountain Range. Of these areas only the strip along the coast is better known; the vast interior, on the other hand, is mostly still insufficiently explored. 133

The Chukchi Peninsula is cut off from the Asiatic contintent on the one side by Chaun Bay on the Arctic Ocean and on the other side by Anadyr' Bay on the Bering Sea. The southern border is formed by the Anadyr' Mountain Range, which represents the watershed between the Arctic Ocean rivers and the Anadyr', and which is more than 1,000 meters high. The region north of the Anadyr' Mountain Range is also filled with lines of mountain ranges almost as far as the coast of the Arctic Ocean. These mountain ranges stretch in a direction from west to east. Further toward the east the contiguous, broad mountain landscape is lost, and the mountain ranges form themselves into two ridges which lie under 800 meters and which, broken through several times by rivers, reach the east coast with the northern mountain range going in the direction of Cape Dezhnev. The cape itself, which lies 77 kilometers from the mainland of Alaska, consists of a single, massive mountain which is 770 meters high and which is formed from limestone. This mountain is completely isolated and is connected with the mainland only by a low, narrow tongue of land, which is

133 covered with tundra. Thus from the sea the cape looks like a mighty island, which in its layout vividly recalls the rocks of Gibraltar. The northern and also the southern mountain chain consist predominantly of gneiss and granite. In the Anadyr' Mountain Range Mesozoic rocks are already drawn into the faulting, and south of this range Tertiary layers are also drawn in; thus from north to south one encounters more recent mountain formations.

As a consequence of the easier accessibility the coast of the Chukchi Peninsula is very well explored. Shelagskiy Cape on the eastern side of Chaun Bay is approximately 950 meters high. Further to the east the mountains, which are 600 to 800 meters high, fall back and make free a broad coastal plain with lakes and beach formations full of lagoons. These beach formations, however, are here and there interrupted by round humpy mountains, in which the basic stone /291/ projects from alluvial land plains. At Kolyuchin Bay the mountains again go right down to the sea. Cape Serdtse-Kamen' has heights of [64] from 600 to 900 meters. Eight polar stations have been erected on the coast of the Arctic Ocean on the Chukchi Peninsula to observe the climatic and especially the ice conditions for the benefit of shipping. These stations are distributed over the Chukchi Peninsula at almost equal intervals. All are equipped with radio stations and are supplied for the most part by airplane. The eastern and southern coast of the peninsula, where the mountain ridges often go down to the sea, is richly divided by various bays. From Anadyr' Bay, KerstaBay penetrates farthest into the land. On a side arm of Kresta Bay lies the highest elevation on the Chukchi Peninsula, the Matachingay. With its 2,800 meters it dominates the mountains surrounding it which are 600 to 800 meters high. At its foot andesite appears, and thus one can probably correctly assume the mountain to be a volcano formation.

137 The bulk of the Chukchi Peninsula is covered with tundra, which makes for a very varied picture according to the relief. Swampy depression tundra, interrupted on the courses of the rivers by pasture and birch underwood, appears only in the valleys and plains. Of greater value is the dry mountain tundra, which is covered with good reindeer moss. The mountain tundra traverses the flat ridges of the mountains and insure the existence of the great reindeer herds of the Chukchi. The higher mountain ranges and mountain peaks are completely without vegetation and are richly sprinkled with rock ruins. Growth of trees occurs very rarely. It is limited to individual, protected spots. Only in the valleys opening toward the south into the Anadyr' region do

smaller forests appear, and then mostly with badly gown and crippled 137
trees.

Permanent settlements exist only on the coast and those are 361
mostly on the Bering Sea. In them live the Maritime Chukchee who 563
devote themselves to the catching of fish and sea animals, and in
some villages there are also Eskimo. The sections of the sea near [225]
the coast of the Chukchi Peninsula are especially rich in walruses,
which are among the main animals hunted here. There are no larger
localities. Except for officials, no Russians remain here permanently.
The interior of the peninsula is occupied by Reindeer Chukchee, a
powerful people, capable of resistance, who own great herds and who
are depicted as excellent in the breeding of reindeer. However, be- [161]
cause of their small number the general density of population is very
low and reaches only approximately 0.03 per square kilometer, and
thus one can traverse great stretches without encountering a man.
Very recently exploration has uncovered valuable natural resources in 135
numerous places. Thus, iron ore, copper, mine gold, graphite,
molybdenum, and also hard coal have been found. Hard coal outcroppings are known directly on the coast of Mechigmenskaya Bay and also in the environs of Cape Serdtse-Kamen'. Pieces of hard coal of excellent quality were also found by Chukchee in the interior. /292/ The greatest part of the natural resources determined to date lie on the east coast, since this alone has to date undergone a more exact investigation. The findings to date permit one to assume, on the basis of the same geological structure, that there are more deposits, and thus in them perhaps one side of the future development of the Chukchi Peninsula is indicated.

The Anadyr' region lies south of the Chukchi Peninsula and is 133
bordered on the west by the Anadyr' Plateau and on the south by the Koryak Mountain Range. The central part of this region is taken up by an extensive depression, which is filled with Cretaceous and Tertiary deposits. For the most part this depression is completely level, but it is not unified, for from the north as from the south mountain ranges project into the depression or rise directly from the plain. To the south of the Anadyr', east of its tributary the Mayn are the Alganskye Mountains, which are up to 500 meters high. The course of all these mountain chains and mountain ridges has still been very little explored in detail.

The Anadyr' comes down from the plateau of the same name, and in its upper course, where it is up to 170 meters wide, it has the

133 appearance of a large mountain river. The high banks already here have good larch forests. In the area around the upper course of its left tributary, the Belaya, which comes from the Anadyr' Mountain Range in the north, there are supposed to be, on the other hand, only poplar forests and no larches. Above Markovo, the principal locality in the interior of the region, the wide plain begins. At Markovo, more than 500 kilometers from its mouth, the river lies only 25 meters above sea level, and thus the drop from here on is very slight. The middle course of the river, therefore, extends over a width of up to 1.5 kilometers and includes numerous islands. The depression, especially the central parts on both sides of the river, traverse wide, lightly hilly, moss-covered swamp areas with numerous large and small lakes and river courses with water which scarcely flows. There are
[131] no forests at all in the depression. West of the Belaya and to the southwest of the basin, the swamp areas here and there still have bushes of alders, poplars, and willows, but toward the east this, too, disappears, and here the landscape picture appears monotonous and can be surveyed over a vast area. Also the spurs of the mountain range and the ridges are mostly flat and covered with a slimy moss covering. Often the mountains still have lakes and brightly iridescent swamp areas on their ridges.

To the north of the Anadyr' depression, as was already mentioned
131 with the Belaya, only poplar forests occur in protected places. Larches are generally rare there. Only south of the depression do they also /293/ appear. In the west, on the other hand, i.e., more removed from the damp-cool influence of the sea, larch forests penetrate into the valley areas and onto the slopes much farther to the north. The transition from the depression to the mountains occurs in the same way almost everywhere. As a rule, poplars and willows, but rarely birches, set in first on the river courses, and, widening into a type of gallery forest, these trees accompany the river even into the mountain range. For this the trees take up the valley bottom, while the slopes are already traversed by coniferous forests. The slopes exposed to the winds and the higher ridges, however, are without forests.

The fact that the Anadyr' depression opens onto the sea permits
132 the influence of the sea to penetrate far into the land. In the west temperatures of -50° are no rarity, while that degree of coldness appears only as an exception in the east. In summer, on the other hand, the coast is cool and rainy, while in the west there are very warm days. The cool fog which envelopes the coast in summer almost never penetrates into the land, however.

almost never penetrates into the land, however. 000

The area occupied by settlements is very slight in the east and 361
in the center of the depression. In the west, on the other hand, there 563
are a series of villages on the Anadyr' and its tributaries. Among these, Markovo with its approximately 500 inhabitants has first rank. Russians, too, live in the villages, but otherwise the population is mostly sedentary Koryak, who pursue fishing and the breeding of dogs. In the peripheral regions Chukchee wander more in the north as nomadic reindeer breeders, Koryak wander in the south, and Laumut and other Tungus in the west. Alternation between the excellent mountain tundra in the protected depressions in the winter forms the basis of their life. In large part, these people are still fully nomadic. However, everywhere among them the effort is being maintained to create fixed, permanent winter quarters; and thus with many of these tribes, especially with the Koryak, a transition to semi-nomadism can be determined. Collectivization also has not stopped at these peoples. In 1948 there were in the Koryak National Okrug 40 livestock -breeding kolkhoz (reindeer), in some of which slight quantities of potatoes and vegetables were cultivated. At 70 points along the coast the Koryak have been brought together into fishing collectives.

There are only a few settlements on the coast because of its 361
flat relief offering little protection from the storms. However, the locality of Anadyr', which has almost 2,000 inhabitants and lies at the mouth of the river of the same name, assumes a central position
here. This town forms the entrance gate to the entire Anadyr' region [505]
and is regularly visited by coastal steamers. A short while ago rather [135]
large Eocene brown coal fields were found in the vicinity of the locality. The main deposit stretches opposite Anadyr' on the northern side of the mouth of the Anadyr' from the point where the Ugol'naya flows into the foot of the Zoloty Mountain Range. On both sides of the mouth of the Ugol'naya appear two seams, which have a thickness of 1.5 meters and 5.8 meters. Mining is already underway here /294/
and supplies the coastal steamers. In addition, Anadyr' is the central [255]
station of state fishing on the entire northern coast; here the catch of the individual fish collection points are delivered and processed in an important canning factory.

Toward the southwest the Anadyr' depression goes over into the 133
Penzhina lowland, the two being separated only by a gently rolling watershed which is up to 331 meters high. The Penzhina lowland, however, is far smaller in size, and is drained by the Penzhina which

133 flows into the Sea of Okhotsk. In comparison with the Anadyr' region the climate here in the Penzhina lowland is somewhat milder. [137] The inclination of the ground is greater, and thus the moss steppes widely diffused here are not so very swampy: the larger rivers are accompanied by poplar forests almost everywhere. Toward the mountains there is the same alternation in the vegetation picture as there. At the mouth 361 of the Penzhina lies Kamenskoye, where the coastal steamers land. 563 The capital, Penzhina, itself is a small village lying in the middle of a lonely moss steppe in the interior of the region. Koryak constitute the majority of the small population. They are in part sedentary, living as fishermen in the villages, or they wander as nomads with their reindeer herds on the good grazing grounds of the moss steppes. 135 In the Tertiary layers, which fill the Penzhina basin, coal-bearing series have recently been found, which also contain lighter lignite in addition to brown coal of good quality. The deposits are said to stretch almost over the entire Penzhina basin.

133 On the east the Penzhina lowland is bordered by a flat mountain ridge, the Penzhina Mountain Range. The very long moss steppe, the Parapolskiy-Dol, whose character is like that of the Penzhina lowland, stretches on the other side of the Penzhina Mountain Range from southwest to northeast. In the south this moss steppe widens and traverses the entire land narrows which connects Kamchatka with the mainland. Here in the middle of the land narrows the moss steppe reaches a height of 155 meters.

The region between the mouth of the Anadyr' in the north and the land narrows in the south is taken up by a still little known central mountain range, which is usually designated the Koryak Mountain Range, after its principal population. This mountain range fills the entire area as far as the east coast, and its waters in the main empty into the Bering Sea. Traversing the land which is mostly formed like a high plateau are three lines of mountain ranges: the Pal-Mal, the Tingeney, and the Rarytkin Ridge. Like the entire Koryak Mountain Range generally, these three belong to the outer zone of the Tertiary faulting belt and are regarded as a continuation of the Kamchatka Mountain Range. In contrast to the interior which is like a high plateau with a general height of 500 meters, the rivers flowing toward the coast are deeply dug in, and thus from the sea an impression more like a mountain range arises. The bulk of the surface is covered with tundra, only the more protected places and valleys have forests. Reindeer-breeding Koryak inhabit the interior and also constitute the population of the /295/ fishing settlements on the coast.

population of the /295/ fishing settlements on the coast. The center of the fishing and the processing of fish is Ust'-Apuka, west of Cape Olyutorskiy. 361 543

Tertiary brown coal deposits have also been found in the Koryak Mountain Range in Korff Bay in the south and in the Ugol'naya Bay in the extreme northeast. In Korff Bay the deposits have already been mined for years, and the coal from here is used to supply coastal shipping. The coal here is of Miocene age and is contained, as far as the supplies have been investigated to date, in 11 seams with a total thickness of 20 meters. In this the quality of the upper seams is very different from that of the lower seams. The uppermost seam represents typical lignite; the lower seams, on the other hand, are like a gleaming, bituminous coal. Mining is supposed to have been taken up in Ugol'naya Bay also, and a coal base is likewise supposed to have been erected. 135

Kamchatka Peninsula

Like a spearhead Kamchatka Peninsula projects toward the south, separating the Bering Sea from the Sea of Okhotsk. The peninsula covers 270,000 square kilometers and has a length of 1,200 kilometers, which corresponds approximately to the distance from Berlin to Rome. 133

South of the Parapolskiy Dol plateau which stretches across the land narrows, the first lines of heights begin, and these then develop into two mountain chains as the peninsula widens. Between these two chains, the western and the eastern, is imbedded the valley of the Kamchatka River.

The low medium mountain range of the west increases considerably in height south of the Palana River. In the area of the Tigil' River the main chain is richly divided up, is accompanied by parallel chains, and reaches already a height of 1,650 meters. In the area around the source of the Bystraya and the Icha rises the truncated volcano cone of the Ichinskaya Sopka, which projects over its approximately 1,200 meter high ground area to the gigantic height of 3,607 meters. The mighty dome of the mountains is covered with glaciers, from which some hanging glaciers flow down. The water from the melting of these hanging glaciers has torn deep furrows. The Ichinskaya Sopka is the sole active volcano in the western half of Kamchatka; thick smoke rises constantly from its crater. South of the Icha the character of the mountain range changes basically. North of the Icha,

/33 Tertiary sandstone and eruptive elements predominate; but to the south, on the other hand, slate, granite, syenite, and porphyry appear predominantly, forming more massive ridges and round peaks. Gradually the height is lowered, and the western mountain range flows together with the eastern line of mountains to stretch then in a line to the southern tip of Kamchatka. The western mountain spurs and parallel chains have numerous old volcano cones, which often rise far beyond the vegetation line. The slender, basalt pointed cones of the Eleuken and the Moreshatnaya Sopka should be mentioned here above all.

/296/ From the sea there rises slowly a treeless moss steppe, which is often designated also as tundra. It rises to a height of 200 meters and then rises rapidly in mountainous forms to a height of 600 meters, whereupon the mountain range zone follows. Only in the extreme north, where the Penzhina Mountain Range stretches to the sea, is the west coast itself steep and also often rocky. For the entire remaining course of the coast, it is flat and represents a leveling coast /Ausgleichsküste/ with numerous narrow bays and coastal lakes. [34] Many settlements, however mostly only small ones, lie in the damp coastal plain, which is in part also swampy. These settlements lie almost always on the lower courses of the rivers at a distance of 10 to 20 kilometers from the mouth, approximately at the border where the forest along the valleys from the mountain range runs into the moss steppe.

The eastern half of Kamchatka likewise forms a medium mountain range, but it has numerous high volcano mountains, whose thick andesite masses traverse the greater part of the land from the middle Yelovka in the north to the southern tip of the peninsula. The number of volcanos, of which 18 are still active, is far greater than in the western chain. The volcanos here lie mostly between the main ridge and the coast. Of the active volcanos, the following are the most important: The Shiveluch (3,335 meters) lies in the angle between the Yelovka and the lower Kamchatka. Its peak has six glaciers. The last eruption occurred in 1928. The Klyuchevskaya Sopka, which is likewise glaciated, rises to a height of 4,775 meters south of the point where the Kamchatka River breaks through the eastern mountain range. The Klyuchevskaya Sopka is the highest point on the peninsula. The volcano cone, which projects to its mighty height directly from the plain of the Kamchatka River with a slope inclination of 30°, is among the most impressive volcanos on the earth. Its last eruption took place in 1931. However, the largest eruption took place before the arrival of the Russians in 1696, when a stream of lava flowed as far as the Kamchatka River in the vicinity of the village of Klyuchi, which lies 32 kilometers from the crater. Usually the peak is enveloped by a cloud of smoke, which in many cases rises 2 to 3 kilometers above the peak and from which a rain of ashes and stones often falls on the slopes. The crater has a diameter of 250 to 300 meters and a depth of 50 meters. Russian scientists were lowered into it in 1931. Their report (29) states: "Clouds of ashes and stones, many of which gleamed in bright red colors, were thrown up 200 to 300 meters and fell down with a rumbling noise. Thick, dark gray smoke perpetually filled the entire crater opening. A sharp smell of sulfur gases and hydrogen chloride filled the air. In the crater itself evening twilight and darkness prevailed, and against this the stones glowing in bright colors shone out all the more sharply and clearly. Indescribable din and deafening noise filled the entire area. During the sixteen hours of the stay in the crater an especially heavy eruption occurred. A mighty cloud rose up to the /297/ heights and poured a hail of glowing rock over the crater."

In the vicinity of the Klyuchevskaya Sopka lie the volcanos Ploskaya and Zamina, which are likewise covered with permanent snow, and farther to the south is the 3, 682 meters high Tobalchik, which is known for its immense crater and for the largest glacier in Kamchatka. Farther to the south follows the Kronotskaya Sopka (3, 620 meters), which was regarded as extinguished until it suddenly awoke again in 1922. At its foot lies the 128 meter deep lake of the same name, which apparently fills an old crater opening. Around it lies a lies a series of high volcanos, of which the Uson deserves special mention. From its deep crater it throws up effervescingly through splits numerous hot springs which have temperatures between 52° and 85°. The Avachinskaya Sopka (2, 731 meters), which at present is permanently active and which lies 30 kilometers northeast of Petropavlovsk, has a double crater and resembles Vesuvius in its structure and appearance, but it is more than twice as high. A last, larger eruption occurred in 1926. Since 1927 it has been throwing out ashes, steam, and gases continually. The lava of the Avachinskaya Sopka belongs to the

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29. Berg, L. S., Priroda SSSR /The Nature of the USSR/, (Moscow, 1938), p. 227.

133 andesite type (172). Not far from the last volcano mentioned, the mighty but quiet Koryatskaya Sopka rises to a height of 3, 457 meters, and next to it is the Sopka Zhupanova (2, 929 meters). South of Avacha Bay the mountain range has many valleys because of the rivers streaming off radially in all directions; but down to the southern tip of the peninsula smaller extinguished and active volcanos lie on the mountain range. The height of the mountains here rarely exceeds 900 meters. The last group of volcano mountains, with the Ilinskaya (855 meters) and the Kambal'naya Sopka (1, 615 meters), rises over an extensive region of mountains, which are gently inclined and like ruins, in the extreme south around Kuril'skoye Lake, which is 306 meters deep and which represents an old crater.

312 Related to the phenomenon of volcanos is Kamchatka's wealth of warm mineral springs. Of these the Nalychevkiye springs between Avacha Bay and the Sopka Zhupanova are worthy of note. These springs come from an andesite layer with a temperature of 72°, and they contain a great deal of borium and arsenic, which is deposited in terraces. Interesting pictures develop in the winter when the steam rains down in the environs and forms fantastic ice figures.

133 The east coast, in contrast to the west coast, is richly divided up by inroads. The projecting peninsulas mostly end with a steep, rocky descent to the sea. The bays, on the other hand, have a broad, flat, treeless strip, which has its greatest size at Litke Bay. Avacha Bay, too, on which Petropavlovsk lies, is surrounded by a coastal plain, which, however, is narrower here.

[30] Enclosed by the high lines of mountain ranges, which protect it from the damp, cold, foggy, snowy, and rainy climate of the coastal sides, the central Kamchatka valley is distinguished by a more continental /298/ climate, which, dispite the harsh winter, is found more pleasant by man than the constantly damp coolness of the coast. The river valley itself is swampy but it is accompanied by a grass steppe, occupied by a spotty stock of birches. This grass steppe offers good conditions for breeding livestock and is not unfavorable even for agriculture. After the break-through to the east the Kamchatka River ends in a wide, treeless delta, which has a special economic significance because of

172. Savritskii, A. N. Piat' let geologicheskikh isledovanii Kamchatki /Five Years of Geological Research in Kamchatka/. Problems of Soviet Geology, 1935.

the schools of salmon which regularly press up the river here in immense masses for the spawning period. 133 [136]

The vegetation of Kamchatka, under the influence of the heavier rainfall and the milder temperatures, has another stamp from 137 that of the forest landscapes along the coast of the Sea of Okhotsk, and in the southern part of the peninsula the vegetation even attains an extraordinarily luxuriant character. The bright, shining green of the deciduous trees dominates the picture, and only in the interior of the Kamchatka valley does the dark color of coniferous forests with Daur larch and silver firs appear. There is on Kamchatka no forest of the type of the Siberian taiga. The characteristic tree here is the birch, and in the first place is the stone birch (Betula ermani) with its gray to red bark. However, the birches never come together in thick stocks; rather they always preserve a certain distance from one another, thus giving rise to a kind of park landscape. Along with poplars, alders, and mountain ashes, the birch covers the entire area of the eastern coast. The landscape here is magnificent when the red fruits of the mountain ash glow out between the various greens in late summer. However, the growth of trees ends on the eastern slopes at a height of 300 meters in the north and at a height of 550 meters in the south. The all too great, cool dampness no longer permits the growth of trees. From the interior of the Kamchatka valley, however, the same birch forest rises to a height of 600 to 750 meters. In the underwood of these forests the Kamchatka honeysuckle (Lonicera edula) is especially worthy of note. Its black-brown fruit is collected in August in large quantities as food by the inhabitants. At heights of 300 to 550 meters the birch forest gives way to the already often mentioned bent wood vegetation, which is especially typical for the mountainous sections of Kamchatka. It consists here of a confusion of entwined branches of creeping alder, Siberian stonebirch, and mountain ash, between which individual rhododendron types grow. These bushes cover whole areas and slopes, and are often so matted that a path through them must be made with an axe, unless one wants to follow a bear path; for the bear has withdrawn into this thicket and is still preserved today in larger numbers. At approximately 800 meters this bush formation ends and is replaced by the zone of the Alpine flora, which generally 133 reaches up to a height of 1,400 meters. The glacier line on Kamchatka lies at a height of 1,500 to 1,700 meters, and thus most of the volcanos have a snow cap, many volcanos are half covered by snow caps, and the Klyuchevskaya Sopka even is covered two-thirds by snow caps.

133 These volcanos, /299/ projecting far beyond the general level, give
the landscape of Kamchatka its peculiar picture.

137 The bottoms of the valleys, if they are not too very swampy
and covered with moss, have luxuriant meadows, which appear especially
in the southern part of the peninsula and which offer excellent
[231] grazing ground for livestock. The introduction of the breeding of
livestock has, therefore, attained the greatest measure here, too.
To be mentioned especially as characteristic of the landscape picture
are the high-growing plants in these regions, especially the umbrella-shaped
"sweet grass" (Heracleum tanatum or Heracleum dulce),
[243] which grows up to 4 1/4 meters high and develops a stalk 12 centimeters
thick. The natives use the juice of this rapidly growing plant
[275] to sweeten their food; the Russians earlier extracted alcohol from the
plant by fermentation.

133 Entirely in contrast to the forest and park landscapes of the
137 mountain regions which are rich in vegetation, are the tundra-like
moss steppes which stretch in a broad zone along the entire western
coast. In the east, on the other hand, these moss steppes form only
a narrow rim around the bays. Occasionally these steppes occur also
in the valleys of the mountain ranges. These monotonous regions are
depressingly dismal and gloomy especially when a veil of fog hangs
over them and prevents seeing any distance.

161 The population of Kamchatka according to estimates, scarcely numbered 20,000 in 1914, and the native element was in the majority at that time. But after World War I and up to the present the population has multiplied because of the increased immigration of Russians, and by 1945 the population was given at around 100,000. Thus today the Russians are predominant, constituting approximately 80 percent of the total population. Today their number is estimated to be at least 150,000. The sedentary population is divided among three lines of settlements: the east coast, the west coast, and the Kamchatka Valley.

563 The Koryak and Kamchadal constitute the bulk of the native population. The Koryak occupy the northern half of the peninsula and the adjoining mainland between the Penzhina depression in the west and the coast of the Bering Sea on the east. On Kamchatka itself they live on the west coast as far as the Sopochnaya River in the south and in the region around Litke Bay. In the Kamchatka valley itself they are no longer to be encountered. Their region of residence has been brought together into a national okrug, in which they, as well as the Chukchee, enjoy cultural autonomy. The capital of their

oblast is Palana, which lies on the river of the same name on the west 563
coast. Almost half the Koryak are sedentary and live in wooden
houses, built after the Russian model, in villages on the coast or on [361]
rivers, where they live from fishing and hunting. All breed the dog
as a domestic animal. Already gardens, in which they grow potatoes
and vegetables, are also very often to be found near their houses. The [231]
bulk of the Koryak, however, remain in /300/ reindeer breeding and
are developing the same good qualities which the Chukchee possess in
this respect. Apart from the Samoyed in the northern part of the
European tundra, the Koryak and the Chukchee are the best reindeer
breeders in the Soviet Union, and they also have more than a third of
the total stock of reindeer in the USSR. The Kamchadal occupy the
southern part of the west coast, the Kamchatka valley; and many of
them are also to be found as workers in the fishing localities on the
east coast. They are under the influence of the Russians in all things [177]
and have become completely sedentary. Fishing and hunting, how-
ever, have remained their principal occupations. But they have in
many cases already given up the breeding of dogs and keep horses,
which are more and more displacing the dog as the riding and draft
animal in the southern part of Kamchatka. The cultivation of vegetables
and potatoes has already become a rule with them. In the central,
more remote part of Kamchatka, there still lives a smaller number of
Tungus Lamut, who are only reindeer breeders. Hemmed in by the
more progressive Koryak and Kamchadal, they constitute the poorest
population on the peninsula. Their herds are only small ones, and
during harsh winters they are to be encountered begging among the
rich Reindeer Koryak.

The heavy immigration of Russians can be traced back to state 167
guidance. In the years 1930 to 1933 alone 15,000 settlers came into
the land. The capital Petropavlovsk had around 28,000 inhabitants
in 1939, which was more than all Kamchatka had before 1914, and
today Petropavlovsk's population is around 40,000. A great part of [228]
the increase in population can be traced back to the building up and
the modernization of fishing and the catching of sea animals. Here [448]
there was formerly a shortage of workers, and this shortage forced
them to bring thousands of seasonal workers every year to Kamchatka
for the catching period. Among these seasonal workers there were
many Koreans and Chinese. This shortage has been eliminated by
immigration. Furthermore new industrial undertakings, especially
complementary branches of the fish processing industry, have come

167 into being. However, a significant part of the immigration has been
also for the benefit of agriculture, which, according to all reports,
has made extraordinary progress. Thus, Kamchatka, which earlier
[244] had to have the bulk of its food supplied from outside, already gets
along in large part with its own production, and the goal of autarchy
in terms of food will probably soon be reached.

In the southern part of the peninsula, which has a mild climate,
231 the breeding of cattle has attained a great and continually growing
significance. The climatic conditions here are approximately the
same as those of Sweden. The number of cattle had already reached
several thousand head by 1939. A series of livestock sovkhoz have
taken over the job of supplying milk and meat to the localities engaged
241 in the fishing industry. In the Kamchatka valley and in the
environs of Petropavlovsk agriculture, too, has made a start. The
area under cultivation increases from year to year. In sovkhoz and
kolkhoz grain, potatoes, and vegetables are cultivated with success.
Fruit /301/ trees were introduced, and today are already yielding
654 their own apples. A series of agricultural experimental stations in
the interior and also in the coastal regions are to prepare the further
development of agriculture and the breeding of livestock.

228 Of greatest importance for the economy of Kamchatka is
fishing and the catching of sea animals. In this respect Kamchatka
is the most important area in the Far East, and it is especially prominent
because of the appearance of highly valuable types of salmon.
The west coast has the principal role in the catching of salmon and
crabs. On the east coast the area around the mouth of the Kamchatka
is a pronounced salmon region, while Petropavlovsk constitutes the
center of the catching of sea animals. From passive, rapacious catching
of fish in immovable, built-in traps--the so-called "fish dams,"
which blocked the river--a transition has been made to catching the
fish in sweep nets and drag nets. Thus the fish are now not caught at
[251] the mouths of the rivers alone but also in the sea. The earlier, primitive
covering of the mounds of caught fish with salt, a
practice which was customary on the entire coast of the Far East and
under which great quantities of fish spoiled, has given way to smoking
of the fish and salting of the fish in vats and above all to processing in
[255] canning factories. Modern fishing steamers with processing equipment
on board have contributed to making Kamchatka today the second
fish-catching region in the Soviet Union, second only to the Caspian
Sea. In the catching of crabs Kamchatka even is in first place in the

world. The crabs are extraordinarily large and attain lengths of half a meter and more. They are drawn up from the bottom of the sea in drag nets in which they get entangled. Worthy of mention in this connection are the floating crab canning factories, which are used on the west coast and which carry out on board all the work from catching to canning. 228 [255]

The capital of the peninsula is Petropavlovsk. The city lies on Avacha Bay, which freezes over only exceptionally. The bay is surrounded in a semi-circle by the panorama of high volcanos. The city's favorable natural harbor, which a short while ago got a shipyard with a dock for ships of up to 5,000 gross registered tons, gains more and more in importance since the ships of the Northern Sea Route spend the winter here before they start out on their trip to the north. This applies especially to ships which regularly travel to the Kolyma River in order to ensure supplies of heavy materials to the gold regions on the upper course of the Kolyma. Petropavlovsk is the center of the hunting of sea animals and of the industries connected with this. In addition, the city also has fish processing installations, a brickyard, saw mills, and a can factory, which is of especial importance since it supplies the necessary material to all the smaller fish processing localities. In the treeless delta of the Kamchatka River lies Ust'-Kamchatsk, the next most important locality on the peninsula. More than 2,000 workers /302/ work in the canning factories there in the summer. The locality, in addition, has a special importance as the gateway to the interior of the peninsula, which can be reached easily only through the Kamchatka valley, while the other approaches have to overcome difficult passes. In increasing measure also wood is floated down the Kamchatka River to the coast, where it is processed in and sent on from Ust'-Kamchatka. In the broad longitudinal valley of the Kamchatka there are a series of villages, among which Verkhne Kamchatsk and Mil'kovo should be mentioned. In this area removed from the coast, horses are kept, since supplying fish food for dogs causes difficulties. At the inner entrance to the cross valley, at the foot of the largest volcano cone, lies the village of Klyuchi, from which the volcano receives its name. Here the traffic lines from the interior merge and make the locality into a central trading place, especially for fur goods. In addition to Russians and Koryak, some Chinese and Koreans have also settled here. Klyuchi has a scientific observatory for the study and special observation of the Klyuchevskaya Sopka. Below the village the Kamchatka widens into a sea decorated with islands. 361 [504] [255] [313] [231] [654] with islands.

361 The main locality on the west coast is Bol'sheretsk. It is the
228 center of the crab and salmon fishing industry. All the catches of the numerous fish collection points flow in here for processing. The main fishing regions stretch from Cape Subchatyy to the southern tip of the peninsula, i.e., more in the southern half of the coast. Further to the north lies Palana, the cultural center of the Koryak.

371 In the future development of Kamchatka, exploitation of the natural resources will play an important role. The supplies of coal and oil have already been treated in detail in another place, and thus only a mention may be sufficient here. Also water power rich in energy is available here. Up until now only small water-power stations for supplying agriculture have existed, although there are also vast possibilities here. Thus Kamchatka shows a relatively favorable picture of its economic development to date with further good prospects for the future.

Commander Islands

133 Approximately 250 kilometers east of Kamchatka there arise alone from the sea the Commander Islands. They are separated from the peninsula by a sea channel which is 1,000 meters deep, while toward the Aleutians the floor of the sea sinks down deeper. The island group, which covers 2,150 square kilometers, consists of two large, inhabited islands, Bering Island and Copper Island, and of two small islands, on which only large numbers of sea parrots and aras make their home. The islands are of volcanic origin and consist principally of andesite tuff and basalt.

Bering Island forms in the north a flat, low-lying moss steppe, while a wild highland traverses the southern part. This highland
132 projects up to 670 meters. The damp, cold, constantly foggy and rainy weather (coldest month -4°, July +11°, annual rainfall 500 millimeters) and heavy storms permit only a crippled growth of mountain ash and
137 willows to come up. The islands lie at the latitude of Moscow. All the more luxuriant is the growth of grass; the Hercules types, which grow to more than the height of a man, are especially striking.

133 Copper Island received its name from the copper enclosed in the volcanic stone. It is formed from a mountain ridge, which is divided into two parts by a land narrows and which descends steeply to the sea. The mountain ridge is broken up by several cross valleys.

The coasts are rocky and steep and are torn up into adventurous, picturesque forms by the heavy breakers. Thus the coasts project a romantic-dim picture in the fog. Thousands of birds make their home on the rocks. 133

The Commander Islands have become famous for the catching of sea otters (seals) there, but this wealth is almost completely destroyed today. The 600 inhabitants, which consist of a mixture of Aleuts, Russians, Eskimos, Kurils, etc., live almost exclusively from what the sea offers them. On the land itself foxes are hunted. 225 161 224

The Kurils

The island garland of the Kurils came to the Soviet Union after the end of World War II. These islands are not too well known, and therefore somewhat more space is to be devoted to them. 133

The Kurils, along with Hokkaido and Kamchatka, form the most northerly arc of the outer frame of the east Asiatic continent. The Kurils represent a connection between the volcanic massif of Hokkaido Island and the volcanos of Kamchatka. To the island chain belong 36 islands which are larger in terms of area, 20 smaller islands, and many uninhabitable rocks, which often barely project from the sea. According to the local division of the islands, the Kurils can be divided into a 1,200 kilometer long main chain, which begins in the north with Shimushu Island and ends with Kunashiri Island off Hokkaido, and into a second, parallel chain, which, however, is only approximately 100 kilometers long. This shorter chain begins at Hokkaido with Nemuro Island, stops with Shikotan Island, and lies east of the main chain. The entire area of the Kurils is given at 15,600 square kilometers, of which 40 percent is on the four largest islands, namely Etorofu, Paramushiru, Kunashiri, and Uruppu. The most northerly island in the chain, whose name is Araito, lies under 50° 56' N latitude, while the most sourtherly lies under 43° 26' N. The Kurils, therefore, lie approximately at the latitude between Leningrad and Burgas in Bulgaria.

/304/ The understructure of the Kurils rises like a mountain ridge from the floor of the sea, whose highest parts project beyond the surface of the water as islands. The slope of this submarine ridge has various forms. Toward the Sea of Okhotsk it declines relatively steeply to a depth of 2,000 meters (the greatest depth is 3,374 meters). The slope toward the Pacific is bigger, for here the Kuril deep sea graben extends along the island chain. This graben has depths between 7,000 meters and 8,000 meters, and its greatest depth is 8,514 meters. The descent to this extraordinary depth occurs still more quickly than on the western side. With individual islands the 200 meter isobar often lies right off the steep decline of the rocky edge of the shore. The islands are separated from one another by sea straits, which are of greatly varying width and depth. Busole Strait, which is more than 2,000 meters deep, and Muzhir Strait, which is 1,800 meters deep, have the greatest depths. All the other sea connections only have depths under 600 meters, and they are in part also only very shallow. A limited exchange of water between the Pacific and the Sea of Okhotsk takes place via these sea straits.

According to the results of research to date, the Kuril chain lies on the surface of an old fault zone, which is buried deeply in the sea and which is of Paleozoic and Mesozoic age. This fault zone was submerged in the formation of the east Asiatic geosyncline. The formation of the latter began in Lower Cretaceous. Miocene was the time of increased sinking, in which thousands of meters of sediments were deposited. On the other hand, the sinking caused faults, strains with thick intrusions of magmatic masses on the eastern edge of the geosyncline, i.e., along the line of the present-day Kurils. At the end of the Tertiary extended longitudinal and also cross breaks came into being. Along the longitudinal breaks there were eruptions and further elevations, while on both sides the ground sank down and formed as an end result a narrow mountain ridge accompanied by deep channels. Thick lava intrusions followed and led to the metamorphization of the sediments broken through. Mighty masses of lava flowed out and formed volcano cones, which projected from the sea as islands. The movement of the earth's crust and the formation of islands have also not been concluded in the present and are shown in the intensive volcanic and seismic activity and also in the elevation of the islands, to which numerous sea terraces give proof.

Almost all the islands consist basically of eruptive rock (andesite lava and tufa); only most northerly (Shimushu) and the most southerly (Shikotan) are formed exclusively from sedimentary rock. On some islands there appears under the lava covering heavily dislocated and metamorphized slate of Paleozoic and Mesozoic age. Also weakly processed formations of the Tertiary are shown in some basins.

The Kurils are typical volcano formations. Fifty-two volcanos have been /305/ counted on them. Of these eighteen are still active today. Of the latter the highest are the Syrycheva on Matsuwa Island and the Prevo on Shimushir Island. The Syrycheva is 1,485 meters high, and the Prevo is 1,360 meters. Extinguished volcanos attain greater heights. According to their structure, the majority of the volcanos are the layer volcano type. The present volcanic activity varies greatly from volcano to volcano. With many (Raikoke, Shimushir), the entire cycle is gone through, from subterranean rumbles to the outburst of gases, the throwing out of ashes and bombs /Bomben/ and finally the explusion of lava. With other volcanos (on Matsuwa and Chirinkotan Islands) the lava flows quietly without collateral phenomena. With many volcanos only one crater exists, with others side craters break out, while constantly working fumaroles form over the splits.

The northwestern part of the Pacific Ocean is distinguished by heavy earthquake activity. Of all the seismic occurrences of the earth which are known, 37 percent occur in the area, and the bulk of these occur in the Kuril chain. The appearance of earthquakes varies greatly within the area of the islands; with many islands they occur up to seven times a year, with others they occur less often. For the most part the earthquakes are related to tectonic occurences on the floor of the sea. The earthquakes have their epicenter as a rule deep under the floor of the sea. Very often submarine outbreaks also result. In many cases there is a connection with the volcanic activity on the islands. The earthquakes themselves do not have the greatest destructive effect on the islands; rather the submarine occurrences do, since they often produce mighty flood waves which storm against the islands with great force and repeat themselves several times. Flood waves of this type have been observed with a height of up to 27 meters. In 1780 a ship lying in the harbor was carried onto the land 400 meters in the interior of the island by such a waves.

The orography and the forms of the Kurils vary greatly. Usually the larger island is traversed lengthwise by a single mountain ridge, which mostly fills the entire island. In many cases also there are two to four mountain chains, or the islands are taken up by an entire system of individual mountains. The mean height of the mountains lies between 500 meters and 1,000 meters, but thirty mountains have been counted with heights between 1,000 meters and 1,300 meters, and there are twelve mountains which exceed 1,300 meters. The northern island, Araito, has the highest mountain, the volcano Oyakopa, which is 2,334 meters high. It is covered with permanent snow, which comes down the slopes to 800 meters. There is also permanent snow on the other very high mountains. Plains and hilly areas occur very seldom on the islands. The gently rolling Shimushu Island in the north and Shikotan in the extreme south constitute a rare exception. Neither, as has already been stated, is formed from volcanic rock, but rather from sediments, and they are regarded by many researchers, therefore, as parts of the mainland which have been cut off.

/306/ The volcanos in their forms are a true collection of models of all types from the ideal volcano cone to volcano ruins. Craters of old volcano ruins on the coasts which are filled with sea water form excellent, protected bays such as, for example, Buron Bay on the island of Shimushir. This bay is 200 meters deep. Often small island groups, through their circle-shaped ordering, indicate the existence of a submarine crater.

In their horizontal division most of the islands show regular forms. Besides round to oval islands, which as a rule are crowned only by a volcano group, there appear above all long stretched out islands. The latter apparently have come into being by the growing together of individual islands. To accomplish this the base was enlarged through an elevation of the land, and the holes were filled by the flow from volcanos. In addition to these two main groups there are also isolated examples of very much torn up islands. The coastal forms are almost everywhere the same. The predominantly steep slopes in the interior of the islands become gentler toward the coast, but then they descend to the waterline in a steep descent which is often almost perpendicular. Off the coasts and between the islands there are numerous rocks, reefs, and banks, which are very dangerous for ships. Volcanic eruptions and earthquakes bring forth manifold changes in the course of time, often within short periods of time and before the eyes of men. Thus in 1937 a volcano island emerged from a depth of 800 meters approximately 20 kilometers off the coast of the island of Araito. The force of the sea is continuously active on the coasts. Washed-out grottos and niches are everywhere to be found in the steep slopes. The most important occurrence, which, however, acts differently in the individual sections of the island arc, is a general elevation. Beach lines and erosion terraces have been established on the slopes up to a height of 300 to 400 meters.

Weathering is very great. On the heights and slopes lie hurled off, angular pieces of rock, which, when the inclination is greater, tumble down and form true "rock seas" at the foot of the mountains. 133 The river valleys are deeply etched in the mountain massif and extend from the highest elevations radially to the sea. Often they end in bays, which are filled with deposits and thus afford favorable opportunities for man to go onto the land. In many cases, on their way to the sea these rivers have dug deep, narrow gorges in the volcanic stone, but often because of the elevation, the rivers have not had time to sink down to the level of the sea. Thus they tumble into the sea as a waterfall at the steep break on the coast.

The climate of the Kurils is raw and brings a cold, long, and 134 relatively dry winter and a cool, damp summer. The climate stands completely under the influence of the monsoonal circulation of air. In winter northwestern winds prevail (70 percent); they have great strength (the monthly /307/ mean velocity of the wind is 14 meters per second) and there is slight relative humidity of the air (60 percent). In summer southern and southeastern winds prevail, but they generally are weaker than in the winter and are often interrupted by calms. The relative humidity of these winds reaches 90 percent. At the end of the summer and in the beginning of the fall very heavy winds, which can attain a velocity of up to 74 kilometers per hour, appear as spurs of southern typhoons. The fluctuations in temperature are not very great (21° to 23°), the mean temperature in the coldest month lies between -5° and -7°, and the mean temperature of the warmest month lies between 14° and 17°. The number of frost-free days is 120 in the north and increases to 180 days in the south. The rainfall ranges from 750 millimeters to 1,000 millimeters, and in the course of the year it has its maximum in August/September and its minimum in January/February. Only approximately a third of the days are without rainfall. Snow begins to fall already at the end of October and lasts on the northern islands until the beginning of May. The snow covering reaches a thickness of 100 centimeters. The cloudiness is very heavy. On many islands only 15 to 30 clear days have been observed in a year. The most beautiful season is the fall, which has the most still and rain-free days. Characteristic phenomena of the Kurils are the numerous thick fogs, which appear primarily in the summer and arise when warm-damp air masses from the Pacific move over the cold Oyashio /Okhotsk Current/. The fogs, as a rule, do not have great thickness, and thus the peaks of the mountains often lie in the sunshine, while all the rest of the island is enveloped in thick fog. The fogs are an extraordinary hindrance to shipping and bring many dangers. From

132 December to the end of April shipping must be stopped completely as a consequence of the ice covering in the area of the islands. Even the most southerly island, Shikotan, is cut off from all traffic with the outside world during this period.

137 Because of the great stretch of the islands from north to south, vegetation on the Kurils has developed very differently. Of the 768 types of flora established to date on the Kurils, 257 have the base of their development in Japan, and only 45 have the base of their development in Kamchatka and the adjoining mainland. On the northern island tundra vegetation predominates with widely diffused bush covering of Pinus pumila, willow bushes and birch bushes. Trees can develop only in some few protected places. The central islands have the poorest vegetation: these islands mostly are also small and of lesser height, and thus the rawness of the cool sea current can have the strongest effect on them. The southern islands have a relatively rich vegetation. Here (Uruppu, Etorofu, Kunashiri, Shikotan) there already appear forests which are rich in wood and have trees with long trunks. In these forests firs (Picea jezoensis, Picea glehni) and the Sakhalin spruce (Abies sachalinensis) predominate. Mixed in with these trees are oaks (Quercus grosseserrata, Quercus /308/ dentata), beeches (Carpinus cordata), and other deciduous trees. In higher places and in the vicinity of the coast there appear meadow-like grass areas, which occasionally lend an Alpine note to the landscape picture.

136 Land animals are slight in terms of the number of types. The brown bear and the wolf are in relation to the distribution of the forests. Very numerous are foxes of all types.

The bird world is extraordinarily rich. In this respect the smaller islands above all are distinguished. Migratory birds are rare. They prefer the Salkhalin route for their wanderings. The real wealth of the Kurils are the fish and aquatic mammals, which undoubtedly are poor in terms of the number of types represented but appear in unusual quantities. Among the fish the same types of salmon should be named as were mentioned in the discussion of Kamchatka. Seals stand in first place among the sea mammals, but sea lions and whales also occur. The valuable sea otter has been almost completely exterminated.

161 The number of permanent inhabitants of the Kurils was around 13,000 before World War II; in the main they were Japanese. Kuril Ainu--the original inhabitants--numbered only several hundred. The

The greatest part of the population was concentrated on the southern islands, 161
where limited cultivation of rye, wheat, barley and types of vegetables 241
is possible. The principal occupations of the inhabitants--if we can 228
judge from conditions before 1945--were, however, fishing and the hunting of sea mammals. Every summer the population was enlarged by around 10,000 fishermen, who came from Japan and occupied the islands for the catching season. In terms of the value of its yield, 225
fishing was in first place by far, but the catching of walruses also played no insignificant role. The whales, after their summer stay in the Bering Sea, moved along the Kurils in the fall to their winter places in the southern part of the Sea of Okhotsk. In addition, seals and sea lions were also hunted.

After the islands were taken over by the Soviet Union and the 228
greater part of the Japanese had been evacuated, numerous central 225
fishing stations were founded on the islands. Furthermore, a walrus-catching fleet was stationed there, and a walrus-processing works was erected on one island. It is also planned to take up the breeding of fur-bearing animals such as the Japanese had begun.

Because of their volcanic character, the Kurils have numerous 312
hot springs, which for the most part contain minerals. In natural re- 135
sources the Kurils are poor; only a few of the islands contain rather large sulfur deposits. Exploitation of these deposits for the Soviet economy is being considered.

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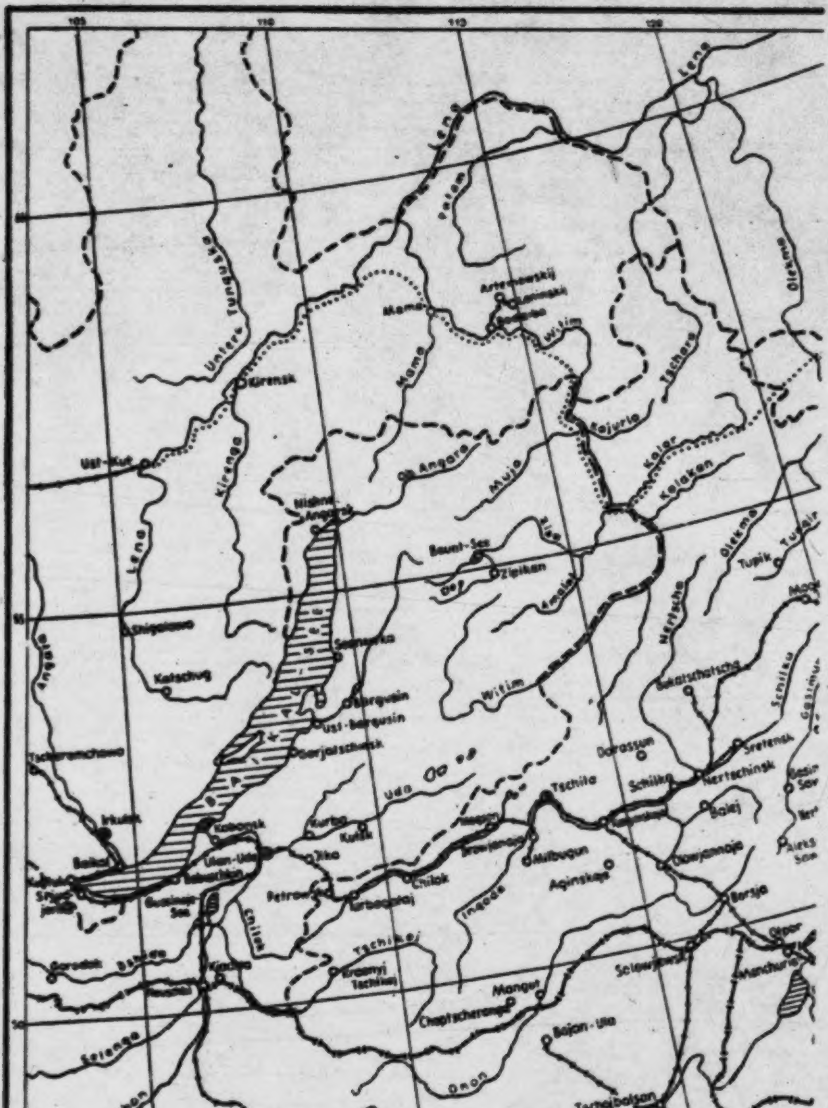
Izvestiia: daily newspaper, Moscow.

3: Thiel--379 K-4, 5 (no date) 1953 RR1 Siberia RR1

Section A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Kalakan
Muja
Angara
Nishne-Angarsk
Baunt-See
Zipikan
Olekma
Tupik
Nertscha
Witim
Schilka
Nertschinsk
Sretensk
Darassun
Tschita
Schilka
Baikal
Irkutsk
Ust-Bargusin
Bargusin
Uda
Kurba
Ulan-Ude
Chilok
Petrowsk
Ingoda
Aginskaja
Borsja
Mangut
Tschikoi
Krasnyi Tschikoi
Kiachta
Selenga
Orchon
Angara
Kaltschug
Onon
Kerulen
Tschojbalsan
Bajan-Ula
Ulan-Bator
Mandschuria
Dsun-Bulak
M O N G O L E I
105
110
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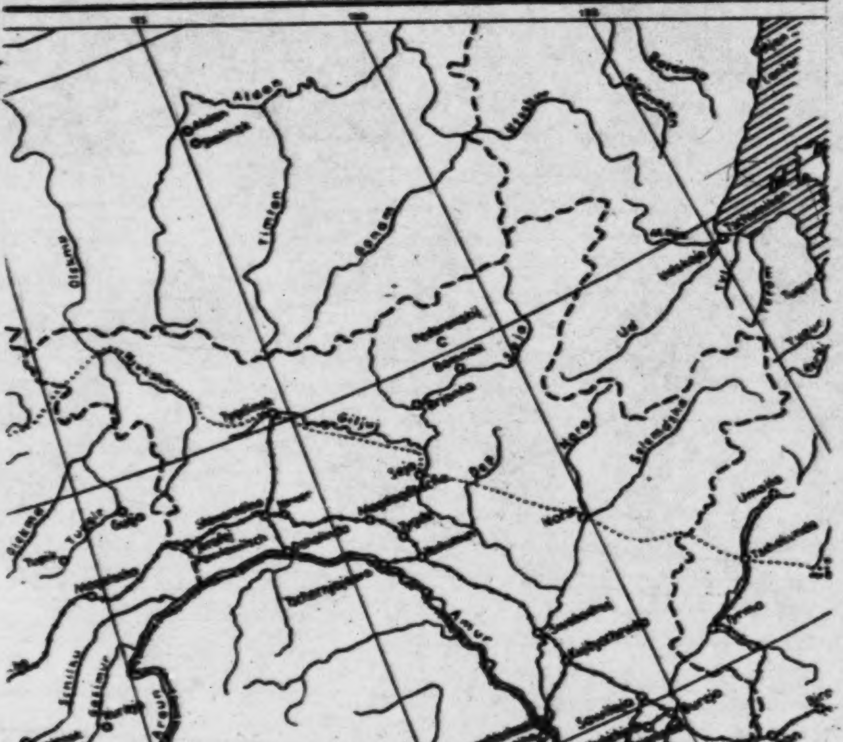
120

Map of the Soviet Far East

-- 3; Thiel--380 K-4, 5 (no date) 1953 RR1 Siberia RR1

102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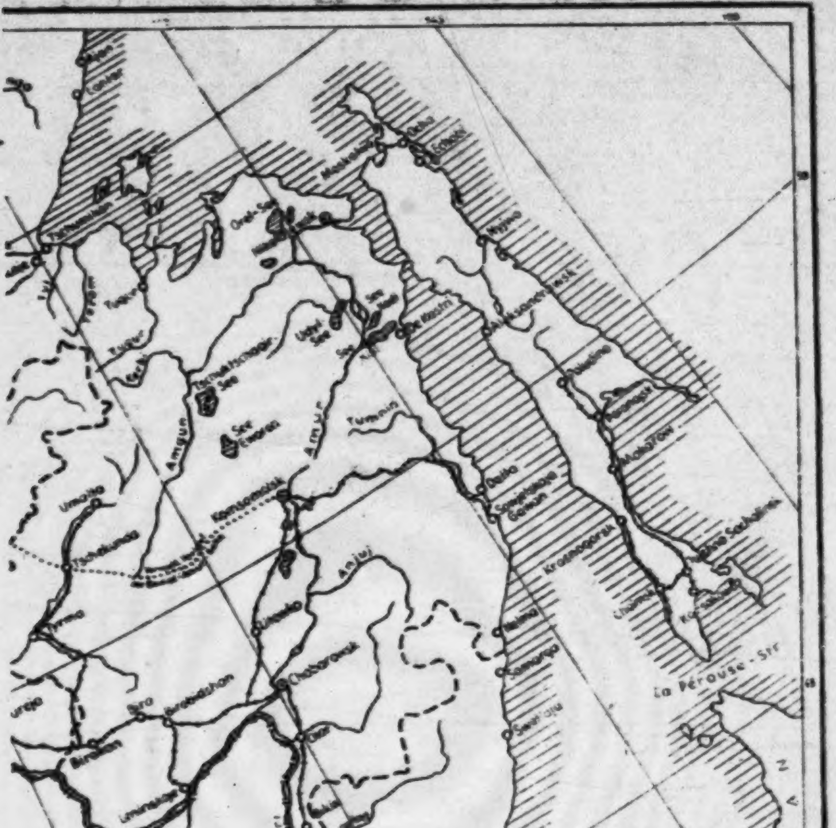
Timpton
Olekma
Ud
Giljui
Zeja
Dep
Nora
Selemdsha
Amur
Argun
Hailar
Bureja
M A N D S C H U R E

Section B

Map of the Soviet Far East

3: Thiel--381 K-4, 5 (no date) 1953 RR1 Siberia RR1

102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Amur
Tumnin
Komsomolsk
Chabarowsk
Sowjetskaja Gawan
Krasnogorsk
La Pérouse-Str
Ussuri
Terney
SOWJET-FERNOST
ÜBERSICHT

Section C

Map of the Soviet Far East

Transkription des russischen Alphabets

Bei geographischen Namen wurde die bisher im Deutschen gebräuchliche Schreibung im Text der Arbeit beibehalten, im übrigen die in der nachstehenden Tabelle angeführte Umschreibung benutzt, der gleichzeitig die übliche englische Transkription beigefügt wird.

	Gebrauchte Transkription		Englische Transkription	
а	a		a	
б	b		b	
в	w		v	
г	g		g	
д	d		d	
е	e	nach Konsonanten	e	nach Konsonanten
	je	nach Vokalen und am Wortanfang	ye	nach Vokalen und am Wortanfang
ж	sh		zh	
з	s		z	
и	i		i	
й	j		y	
к	k		k	
л	l		l	
м	m		m	
н	n		n	
о	o		o	
п	p		p	
р	r		r	
с	s,	jedoch zwischen Vokalen ss	s	
т	t		t	
у	u		u	
ф	f		f	
х	ch		kh	
ц	z		ts	
ч	tsch		ch	
ш	sch		sh	
щ	schtsch		shch	
ъ	unbezeichnet		unbezeichnet	
ы	y		y	
ь	j		'	
э	e		e	
ю	ju		yu	
я	ja		ya	